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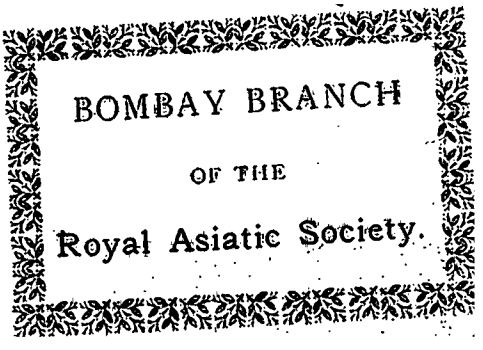

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TECHNICAL AND PRIMARY EDUCATION.

CIRCULAR

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LORD STANLEY TO HER MAJESTY'S REPRESENTATIVES ABROAD,

TOGETHER WITH THEIR

REPLIES.

Presented to both Houses of Parliament by Her Majesty's Command.
1868.

LONDON:
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1868.

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Circular addressed to Her Majesty's Ministers Abroad.

Foreign Office, July 17, 1867.

I INCLOSE papers indicating the points bearing on the system of Technical and Industrial Education in Foreign Countries, upon which a Royal Commission appointed to inquire into certain matters connected with education in this country are anxious to obtain information.

Her Majesty's Government are of opinion that this information will be of great value to the commercial interests of this country at the present moment, and I have therefore to desire that you will instruct Her Majesty's Secretary of Legation to furnish in his next Commercial Report, if possible, all the information in his power upon this subject, and particularly upon the points referred to by the Royal Commission.

I am, &c.
(Signed) STANLEY.

Information sought relative to Technical or Industrial Education in Foreign Countries.

1. WHAT is the nature of any technical or industrial education which is carried on in ? What are the particular industries which it is intended to promote? Are there any distinct schools or colleges, &c., for the purpose?

2. If there be such schools or colleges, with what industries are they connected?

3. For what class of persons is this technical instruction adapted? for masters, overlookers, or workmen?

4. In what way are these institutions supported? and particularly do they receive any contribution from public funds, as endowments, subsidies from local or central authorities?

5. What is the average number of the students?

6. What is the cost to a student? Are there any exhibitions or free places tenable at Industrial Schools,

&c.? Do private manufacturers often defray the expenses of students?

7. Is there any special qualification required for admission to the Industrial School, &c.? What is the time usually spent by students at the schools, &c.? and the ages and sex of the students?

8. What is the amount of education presumed, or generally acquired, before admission to the school, &c.? What are the subjects of instruction at the school, &c.? What is the mode in which instruction is given? Is the instruction accompanied by participation in actual manufacturing works or processes?

9. Are there any special privileges attached to studentship at the school, &c.? Is any special education of this kind made necessary for admission to the exercise of any particular trade or profession?

10. How are the teachers appointed? What qualifications are they required to have? How are these qualifications ascertained? and how obtained by those who possess them?

11. What advantage, if any, has resulted from these schools, &c., in promoting or extending the manufactures with which they are connected?

12. What is the opinion prevalent among the industrial classes, whether employers or employed, with regard to the working and effect of these schools?

Those who are employed to collect this information should also send any Reports made by the School authorities to their own Governments that may be obtainable.

Heads of Questions relative to Education, Technical or Industrial, in Foreign Countries.

1. WHAT is the nature of any technical or industrial education which is carried on in the country in which you reside?

What are the particular industries which it is intended to promote?

Are there any distinct schools or colleges, &c., for the purpose?

2. If there be such schools or colleges, with what industries are they connected?

3. For what class of persons is this technical instruction adapted—for masters, overlookers, or workmen?

4. How are these institutions supported (buildings and annual cost)?

Do they receive any contribution from public funds, as endowments, subsidies, &c., from local or central authorities?

5. What is the average number of students?

6. What is the cost to a student? Are there any exhibitions or free places tenable at Industrial Schools, Technical Colleges, &c.? Do private manufacturers often defray the expenses of the students, or are they supported at the cost of the public?

7. Is there any special qualification (age, previous school attendance, attainments), defined for admission to the Industrial Schools or Technical Colleges?

Is admission made dependent upon examination, and if so, upon a competitive or a pass examination?

If admission is not by examination, on what does it depend?

8. What are the subjects of instruction at the school or college?

What is the mode in which instruction is given? Is the instruction accompanied by participation in actual manufacturing works or processes? What is the time usually spent by the students at the schools or colleges? What is the present ordinary age of the students? Do they include males and females? and in what proportions? Are the students subjected to examination at the end of their course? If so, are they classified according to proficiency? Is any certificate or degree granted? How is the student affected by the results of the examination?

9. Is any special education of this kind made necessary for admission to the exercise of any particular trade or profession?

10. How are the teachers appointed? What qualifications are they required to have? How are these qualifications ascertained? And how obtained by those who possess them?

11. Are the students lodged and boarded in the schools or colleges? Or do they attend lessons only from

their own homes or lodgings? Is any supervision exercised over their morals or religion? If so, by whom? And how is difference of religion among the students provided for?

12. What advantage, if any, has resulted from these schools or colleges in promoting or extending the manufactures with which they are connected? Have they had any effect in encouraging elementary schools? If so, how?

13. What is the opinion prevalent among the industrial classes, whether employers or employed, with regard to the working and effects of these schools and colleges?

NOTE.—It is important that this information should be returned by the 1st of January, at the latest.

It is requested that any reports made by the school authorities should be transmitted, as well as any pamphlets, books, or documents of a superior character, relating to technical or to elementary education.

REPORTS.

No. 1.

Mr. Ward to Lord Stanley.—(*Received September* 16.)

My Lord, *Hamburg, September* 13, 1867.

In conformity with the instructions conveyed to me by your Lordship's circular despatch of the 17th of July last, I have the honour to lay before your Lordship herewith two papers containing the requisite information in regard to the system of technical and industrial education pursued in the cities of Hamburg and Lubeck respectively, together with seven printed Reports and pamphlets bearing on the subject.

I find on inquiry, that at Bremen there is not yet any school of industry or trade, although the establishment of an institution of the kind is in contemplation.

I have, &c.

(Signed) JOHN WARD.

Inclosure 1 in No. 1.

Information relative to Technical and Industrial Education, chiefly furnished by Mr. O. Jessen, Director of the Hamburg Trade School.

Hamburg.

I. Very little has been done hitherto in the ordinary schools in Hamburg for industrial education. Everything necessary for a mercantile career is carefully attended to, but the important branches of mathematics, natural science, and drawing, so necessary to industrial arts, have been neglected, while foreign languages, arithmetic, and penmanship, occupy a prominent position. Those young men, however, who wish to devote their attention to handicrafts, have, after leaving school, the advantages of the following institutions offered to them:—

1. The Public Trade School (Gewerbe-Schule).
2. The School for Building and Architecture (Schule für Bauhandwerker).
3. The Workmen's Educational Union (Bildungs Verein). (These schools have altogether about 800 members, the greatest part of whom belong to the trading classes. Every member is permitted to take part in the instruction.)
4. Jessen's Polytechnic Preparatory Institute.

Besides these, the upholsterers have an evening drawing school during the winter, for their sons and apprentices, attached to the Upholsterers' Union. It is, however, of little importance, and its pupils, as well as those of the Painters' School, intend in future to attend the Public Trade School.

In the three first named schools, the greatest attention is paid to building and carpentery, furniture and joinery, the decorative arts (viz., decorative painting, lithography, engraving, wood and ivory carving), metal working, and ship-building. The two first-mentioned schools are the most important.

II. There is no connection between these schools and any particular trades. The pupils are nearly all engaged as apprentices or workmen, and in the upper classes are employed in making drawings, plans, &c., under the direction of the teachers, to be used in their workshops.

III. The instruction is specially for apprentices and workmen, but foremen and overlookers, as well as those masters who have their own establishments, may attend.

IV. The two first-named schools are supported by the State out of the public funds, receiving 17,000 marks, Hamburg currency (£1,000) per annum; and the Patriotic Society (which until two years ago supported a school of the same kind), gives the rooms rent free. The Educational Union supports itself by the subscriptions of the members. The Polytechnic Institution is a private undertaking, without any public support.

V. The number of scholars in these industrial schools has been :—

	Winter Session, 1866-7.	Summer, 1867.
Public Trade School	579	474
School for Building and Architecture ..	92	—
Educational Union, about	200	150
Polytechnic Preparatory Institute ..	42	42

VI. The fees for scholars in the Trade School is, for the half year, 1st Class, 4 dollars (12*s.*), 2nd to 4th Class, 3 dollas (9*s.*), boys class for drawing, 2 dollars (6*s.*). Apprentices who are unable to pay for themselves are paid for by their masters. A few are admitted free of charge altogether, while in some cases, one-half or one-third of the fees are remitted. Teachers wishing to improve themselves in drawing are allowed to attend without charge.

The fees in the Architectural School are 30 dollars (£4 10*s.*) for the session of five months. There are also advantages granted to those who are unable to pay the full fees.

VII. Special qualifications are not required for admission to these two schools. The pupils must be fourteen years old, but boys are admitted at the age of twelve to learn free drawing without instruments, which is taught four times weekly. The number of hours in the week which the scholars spend at school varies in the Trade School from two to sixteen hours weekly. In the Architectural School, which has only a winter session, they attend fifty-four hours weekly.

VIII. The pupils have generally attended the ordinary national schools, either in town or country, so that they are able to read, write, and cypher pretty well. For subjects of instruction, see Appendix A. The instruction in German, arithmetic, mathematics, and natural philosophy, is given in such a way as to enable the pupil to express himself as soon as possible with exactness and promptitude; to execute the ordinary examination tasks correctly and readily; to learn quickly

the laws of form and natural philosophy, and to have them impressed upon his memory. The laws discussed are developed, by the teacher continually asking questions, and are further fixed in the mind by exercises which are to be worked out without assistance. Free drawing without instruments begins with drawing from wooden models, according to Heimerdinger's method*, in which simple objects, such as tools used by joiners, engineers, &c., are included; attention being paid to the vocation of the pupil in the choice of the models. Ornamental drawing from plaster casts, in outline, and in respect to shading, then follows. Those pupils who devote themselves to building or ornamental trades, study the figure from casts and anatomy. The metal workers draw freely, without instruments, portions of machinery, &c. The mode of execution (which is with lead pencil, pen, brush, and rubber) is always the most suitable to the branch of technical art to which the pupil intends to devote himself. In close connection with this style of drawing, are the exercises in ornamental design. Plants, flowers, and leaves are drawn from life, and these drawings are used in designing. By these exercises the pupils become very soon independent of all help. Geometrical drawings are executed from large copies. The teachers explain the perfect principles of construction, and pay special attention to exactness in execution. When the pupil has acquired confidence in the use of his instruments, and has mastered the essential principles, the measuring and drawing of some simple and more complicated bodies follows. This class is attended by metal-workers, joiners, builders, and carpenters, carriage-builders, ship-builders, &c. The instruction is imparted by measuring and drawing real objects, such as parts of machinery, tools, furniture, doors, windows, carriages, &c., according to fixed rules and specified plans.

Instruction in freehand drawing can only be of use to the pupils when they use real objects, and not drawings. By the method pursued here, the hand needs no particular preparation, because the nearest model offers an example by which the hand and eye are both alike exercised. No particular introduction to the rules of perspective is needed, the scholar learns to see correctly, and his attention is directed to the principles of perspective by the teacher.

From the specimens of freehand drawing which were exhibited at Paris this year, it would appear that no method can compare with that here referred to, for producing a satisfactory result in a short time. The results of several other industrial schools are in this respect far behind those of the Hamburg School. Drawing from specimens should be entirely avoided in industrial schools, in freehand as well as in geometrical and technical drawing. In the instruction of teachers, this method has been followed for a number of years in Mr. Jessen's Polytechnic Institute, and also for the last two years in the Hamburg Trade School, with most satisfactory results. The pupils of both show great application and zeal, and make good progress. There are no workshops connected with the Trade School.

IX. No special privileges are possessed by the scholars. Attendance at these schools is not necessary for admission to any trade or profession.

X. The director of the two schools (industrial and architectural) receives 2,000 dollars (£300) per annum. The teachers receive 40 dollars (£6) for each week during the session. They are selected by the Government School Administration upon the recommendation of the director. Care is taken to ascertain that they have exercised

* "Elements of Drawing from Bodily Objects." Hamburg, 1857.

similar functions previously, and testimonials as to their thorough fitness are required.

XI. During the short period of its existence, the trade school has been very successful, and the number of pupils has steadily increased, especially in the winter session. Those manufacturers whose apprentices have attended the school speak very highly of its advantages, and state that such apprentices make rapid progress in their work, and are exact and intelligent.

XII. The preponderance of opinion among the industrial classes is decidedly favourable to the Hamburg Trade School. This also appears from the fact that the Assembly of the Burgership has, of its own accord, voted the funds necessary for the school; and has lately expressed to the Senate its unanimous wish that a proper building should be erected for its accommodation. All those artizans who have emancipated themselves from old prejudices promote the interests of the school by sending to it their sons and apprentices.

The annexed pamphlet, marked E, containing a report of the Hamburg Patriotic Society in the year 1863 on trade schools and museums will be found deserving of attention.*

It may be useful to add that the best polytechnic schools in Germany are those at Carlsruhe, Stuttgardt, Hanover, Berlin, and Dresden. There are also architectural and building schools at Stuttgardt, Nienburg, Hildesheim, Holzminden, Höxter, and Siegen. Trade schools for handicraftsmen and mechanics are to be found in all the principal towns of Würtemberg, Baden, and Hesse-Darmstadt. At Nürnberg there is a good trade school in connection with artistic objects, and at several towns in Bavaria and Saxony there are Sunday schools for drawing and other branches of industrial education. At Elberfeld, and at Brunn, in Moravia, there are special schools for weavers, which are said to have answered very well.

Hamburg, September 13, 1867.

Inclosure 2 in No. 1.

Information respecting Technical and Industrial Education, furnished by Mr. C. Claus, Head Teacher of the Lubeck Trade School.

Lubeck.

I and II. A trade school has existed in Lubeck since 1841, the object of which is the promotion of industrial pursuits in general.

III. The instruction in the trade school is principally intended for artizan apprentices. The institution is, however, also attended by boys who are above twelve years of age, and who wish to devote themselves to industrial pursuits after their confirmation. Besides these pupils, the school is attended by those who wish to prepare themselves for entrance into polytechnic schools, agricultural institutes, &c.

IV. The trade school is an institution founded and supported by the Lubeck "Society for the Promotion of objects of Public Usefulness." The intention is, however, entertained of incorporating it among the other institutions of the state.

V. The total number of scholars is at present 200.

VI. The annual cost of the school is 4,200 marks (£250), not including the rent; according to which the instruction for each scholar costs about 21 marks (25*s*). Orphans receive instruction gratis, in

* See Appendix, pp. 318 and 358.

consideration of the unfavourable circumstances in which they are generally placed. In some cases the fees for apprentices are paid by their masters.

VII. The advantages of the school are open to all such boys as have completed their twelfth year. The hours of instruction will be found by reference to the accompanying report, marked F.

VIII. Those who wish to attend the trade school must, at least, understand the first four rules of arithmetic, and be able to write readily from dictation, and the majority of the pupils are able to exceed these requirements. The subjects of instruction and the particulars are contained in the report F.

No special method of instruction has been introduced, because, on the one hand, all the subjects of instruction, if taught in the same manner, would not produce the desired effect; and, on the other, the individual action of the teachers could not, in a pedagogical point of view, be much limited without injuring their efficiency. The instruction is, however, imparted in such a way as to stimulate the minds of the scholars, and to cultivate independence of thought.

As most of the pupils are practically engaged in the workshops of their masters, the practical part of the instruction is, without inconvenience, dispensed with at the school. Continual attention is, however, paid to the application of the instruction to the daily work of the pupils, besides which the subjects are brought clearly before them by means of experiments.

The school possesses, and is continually acquiring for this purpose, philosophical apparatus, chemical preparations, models of machinery, technical plans, &c.

IX. The pupils of the school enjoy, as such, no special privileges.

X. The teachers are engaged permanently, but may leave, or be dismissed, by six months' notice. Their ability to teach, and their complete mastery of the subjects required to be taught, is ascertained by examination and testimonials. The present head teacher received his technical and scientific education through an attendance of many years at the Polytechnic School in Hanover. The other teachers have been educated in seminaries for teachers, and have also formerly attended the trade school.

XI. The school has unquestionably led to increased mental activity, and has heightened the interest felt by the trading community in the progress of industry.

XII. The favourable opinion which is entertained respecting the usefulness of the trade school by the manufacturing classes may be best proved by the fact, that parents and masters send their sons and apprentices to it, in consequence of which the school is well filled, although attendance is not at all obligatory.

Lubeck, September 6, 1867.

No. 2.

Mr. Ward to Lord Stanley.—(Received November 11.)

My Lord, *Hamburg, November 7, 1867.*

HAVING in the year of the exhibition of German industry at Munich, to which I was delegated as the British Commissioner, made a report to the Earl of Clarendon upon the educational institutions existing in Bavaria for practical science and art, which report was afterwards printed as an appendix to the Third Report of the Commissioners for

the London Exhibition of 1851, and laid before Parliament in 1856, I have the honour to lay before your Lordship a copy of that report, thinking that if reference were made to it in the proper quarter its contents might promote the object of the Schools Inquiry Commission to obtain information as to the state of technical education in foreign countries.

Although my report is dated so long back as the year 1854, I have reason to believe that the system of technical instruction pursued in Bavaria has not been materially altered since that time, and that it is still found to work beneficially in diffusing a correct knowledge of the principles of arts and manufactures among the population of southern Germany.

I have, &c.
(Signed) JOHN WARD.

Inclosure in No. 2.

Report by Consul-General Ward on the Bavarian Educational Institutions for Practical Science and Art.

My Lord, *Leipzig, October* 18, 1854.

In obedience to that part of your Lordship's instructions of the 15th of August last, which directed my attention to any instructions at Munich, or the neighbouring towns, for the promotion of Science and Art, I have the honour to submit to your Lordship some account of the schools and other educational institutions, whereby the people of Bavaria are trained for a career in trade or agriculture, in the polytechnic arts, the fine arts, and the higher branches of exact science.

1. Munich is deservedly celebrated for the magnificent public buildings which have been erected in it, the remains of ancient art which it contains, the achievements in modern art, in sculpture, castings, pictures, and frescoes, which have been accomplished in it, and the many similar works which are still going on there. The genius of King Louis has converted the formerly dull and and uninteresting Bavarian capital into a repository and school of the fine arts. In reviving the classical spirit of the ancients, King Louis has also known how to call into existence another form of art,—the religious-romantic,—which characterises the productions of the first masters of the day, and is so much in harmony with the genius and feelings of the nineteenth century. Munich has in consequence become a place of resort for artists of all nations, and is visited by the lovers of the beautiful from all parts of the world. Without dwelling, however, upon what is so universally known, or attempting any description of the galleries and artistic collections, whose contents have been detailed over and over again in printed books, my present object is more especially to advert to the fact that the late King of Bavaria has not only raised a city which will remain a monument of his energy and taste,* but has done much more by laying the foundation of a good system of national education for the industrial classes of the people. I shall endeavour to explain this system with as much conciseness as a due notice of the various institutions comprised in it will admit of.

2. The technical branch of the Bavarian educational system dates from the year 1833, when it was regularly organized in a progressive

* The population of Munich was 40,638 in the year 1812; in 1853 it had risen to 128,803, including the suburbs and the garrison.

series of institutions, from the schools of trade and agriculture to the polytechnic and the technical high school. The popular instruction in the elementary German schools had a direction given to it corresponding with that of the trade schools, and by this and the formation of drawing schools for the people, an opportunity was afforded to pupils of the most limited means to lay the groundwork for that artistic ability which is generally so valuable in the mechanical and manufacturing career. For such as might be unable to attend the trade or the polytechnic schools, separate schools were opened on Sundays and holidays, where they might acquire much useful knowledge, and extra lectures were appointed to be given in the trade schools for the benefit of apprentices and others who were not regular pupils. In this way technical information has been very widely diffused among the people, and the youth of the middle classes have been furnished with the means of attaining excellence, either in the fine arts or the exact sciences, or in those branches of knowledge which are the most necessary to trade and manufactures.

3. By an ordinance of King Louis, dated the 16th of February, 1833, the new educational plan (which does not interfere with the gymnasia or the course of classical and purely scientific study previously established) was authoritatively introduced. It is therein declared that neither the polytechnic nor the trade schools were intended to be in themselves schools of art, but were designed to carry art into trade and manufactures, and to raise the latter to the point which the progress of technical skill and the necessary competition with foreign industry required. The basis of a good technical education was first to be laid in the elementary schools, where the rudiments only of linear and ornamental drawing were to be taught, and the instruction in useful objects was to be adapted to the future wants of farmers and tradesmen, and to be made preparatory to the lectures to be given in the schools of agriculture and trade. The first step, as well as the foundation of technical instruction, would be the schools of trade (Gewerbe-Schulen). The instruction to be given in these schools was to begin with arithmetic, simple geometrical drawing, and the doctrine of the circle, simple ornamental sketches, and the rudiments of natural history, and was to conclude with architectonic drawing, free sketching by hand, exercises in the style of business and in book-keeping, and, when required by the line of pursuit, the necessary knowledge of chemistry. These, as well as the proper lessons in languages, geography, and history, were to be divided into a three years' course of study.

The schools of trade were not promised any direct allowance from the State, but were to be supported by various means, such as the revenue of the former town schools, voluntary contributions, moderate payments by the scholars, certain foundation and charity funds, and subscriptions of the parishes. In each circle of the kingdom a trade school of the circle (Kreisgewerbschule) would be established at the principal town, which school would receive 5,000 florins out of the funds of the circle.

Every trade school of the circle was to have an agricultural master to teach farming, in so far as the same should not be included in the instruction imparted in common to the commercial and agricultural classes. The establishments of any good master manufacturers and any farms in the neighbourhood were to be made available, so that the pupils might see the practical application of what they learned.

The superior trade instruction, viz., that of the polytechnic school, would begin with the higher branches of drawing (architectonic, geo-

metric, and perspective drawing, mathematics, descriptive geometry, experimental physics, and the rudiments of civil architecture), and it would conclude with mechanical and architectural drawing, the doctrine of machinery, and mathematics, technical chemistry, and, if suitable to the destination of the pupil, embossing and modelling, also the leading principles of the arts of road, canal, and bridge making. Here, also, the studies would be distributed over a three years' course.

The polytechnic schools would be established at Munich, Nuremberg, and Augsburg. The sum of 20,000 florins,* inserted for the purpose in the State budget, would be divided amongst them. It was enjoined that each of these three schools, as well as the respective schools of trade, should principally cultivate those branches of knowledge for which its locality appeared most favourable; that; consequently, the Munich school should devote itself to building, and objects connected with the artistic; that at Nuremberg casting and metallic manufactdres should be chiefly attended to; and at Augsburg, the woollen and cotton manufactures, weaving, and dyeing.

The highest grade of instruction for the technical pupil would be found in the so-called technical high school, composed of the professors of the Cameralistic faculty, and those of chemistry, mathematics, physics, &c., in the university, and so concentrated as to form an institution in itself. But those students who might choose a purely artistic career might proceed at once to the Academy of the Fine Arts, and complete their education in art as pupils of that institution.

Such were the principles established by the enlightened King of Bavaria for the instruction of the great mass of his subjects in the real or practical branches of knowledge. For classical education (*literæ humaniores*), institutions already existed, nearly similar to those in other German States, viz., the Elementary Latin Schools; the Gymnasia for Greek, Latin, &c.; the Lycæa, or higher Gymnasia; and the University, as the high school of learning and pure science. These institutions were not interfered with by the new technical system; the intention was to separate the two great paths of knowledge, but that they should both be followed at the same time by their respective classes of students, the one *pari passu* with the other.

4. Regulations in detail, for carrying out the principles thus laid down by the King, were issued by the Minister of the Interior, on the 4th of April, 1836. They are arranged under seven heads, and are stated to have been drawn up after previous communication with all those persons most conversant with education and practical science.

Under the *first head*, technical instruction is declared to comprise all those branches of instruction whose bases and object fall properly within the sphere of the exact sciences. The branches are four, viz.:—

The qualifying for a purely artistic career.

The qualifying for the public service, in the department of works, roads, bridges, mines, salterns, and forests.

The qualifying for the professions of civil engineer, machine-builder, &c.; and,

The qualifying for the ordinary callings of citizens, such as manufacturing, productive trades, building, and the improvement of the soil.

Technical education stands between the purely scientific and the merely popular. Its groundwork is laid in the Latin and the German elementary schools, which all children are by law obliged to attend; if

* One florin is equal to about 2*s.* sterling.

Catholics, from the age of six to twelve, and if Protestants, from the age of six to thirteen years. Here the instruction in drawing and in other objects of useful knowledge begins. When the first period is over, the separation takes place, and the youth proceeds either to the classical gymnasium, or to the school of trade and agriculture; but if he does not become a pupil of either of these institutions, he is obliged to attend the Sunday and holiday schools; if a Catholic, for courses of four years, and if a Protestant, for courses of two years and a half. The schools of trade and agriculture are thus the technical, as opposed to the classical gymnasia; they are continued in the polytechnic schools, or technical Lycæa, which correspond with the classical Lycæa; and culminate in the technical high school, which also answers to the scientific high school in the University of Munich. There is to be no contest between the principle of *humanism* and that of *realism*, but an harmonious development of each principle distinctly on separate lines. Either system is well calculated to awake the intelligence of the pupil, and to stimulate his faculties in the destined direction, whilst each inculcates moral duties and religious sentiments in an equal degree.

Secondly. Drawing is required to be taught in the Latin, as well as in the elementary German schools, gratuitously, that is to say, simple geometrical figures, circles, and lines, and simple sketches and copies. In the elementary schools, not merely language and grammar, but the rudiments of arithmetic, geography, and history, are included in the course.

Thirdly. The objects of the schools of trade and agriculture, in which the technical branch of education begins, are reiterated, as well as the sources from which these schools are to be maintained. The funds transferred from the old town schools amount to 23,017 florins per annum. The technical instruction, properly so called, is to embrace the whole range of trade, manufactures, and produce of the soil, geometry, and algebra, as far as equations of the second degree, drawing, embossing and modelling, mechanics, natural history, the rudiments of chemistry, and book-keeping. For the agricultural pupils the course is varied according to their requirements. Provision is also made for regular instruction in religion, history, geography, and the German language, of which the last three are taught to such technical pupils as come from the Latin school, in common with the pupils of the gymnasium, and to the rest of the technical pupils in the Sunday and holiday schools.

Under the *fourth head* are explained the objects of the Sunday and holiday, agricultural and mechanics' schools, which are distinct from the schools of trade last mentioned. They are adapted to such young farmers and trading apprentices as may not be able to attend the daily schools. The instruction is given gratis, and comprises the rudiments of linear and ornamental drawing, and of geometry, embossing, and modelling, popular physics, chemistry, and machinery, and agriculture. This technical instruction is given during hours not occupied by the so-called real objects, viz., religion, history, geography, and the German language, which are also regularly taught in the Sunday and holiday schools, as already mentioned.

Fifthly. The polytechnic schools, or technical Lycæa, are described as embracing the higher technical sphere, whilst the schools of trade and agriculture occupied the lower, and were, in so far, preparatory. The course is three years. Besides the three Government establishments at Munich, Nuremberg, and Augsburg, other towns are allowed to form polytechnic schools of their own, subject to the conditions prescribed, but this liberty has not been availed of. The objects of

instruction are,—drawing; mathematics, pure and applied; descriptive geometry; experimental physics; technical chemistry; architecture; road, canal, and bridge-making; embossing and modelling; the history of trade, and the outlines of political economy. Pupils are admitted at the age of fifteen, if they have gone through either the trade school or the gymnasium. From natives no payment is required; foreigners are to pay only 12 florins per annum. Pupils who take only a limited portion of the general instruction are also admitted, under the name of "hospitanten," on payment of 6 florins for each course of lectures they attend.

Sixthly. The Academy of the Fine Arts is enumerated as holding an important place among the technical institutions of Bavaria. It receives pupils who have passed through the proper stages of the polytechnic school in order to complete their education in any of the branches of pure art or in architecture.

Lastly, under the *seventh head*, the technical high school in the University is declared to be the keystone of the system of technical education, and the highest point to which it can be carried. It is additionally valuable as a school for the formation of teachers, and as a resort for the candidates for Government employment in the technical branch.

The high school is concentrated in the political economy or Cameralistic faculty of the University of Munich, and forms a complete institution in itself. It comprises the following professorial chairs:—two of forest science, one of the higher mechanics, two for mechanical and chemical technology, one for agriculture, one for pharmacy, one for political economy, one for mining, and one for the science of police. Besides these, students have the benefit of the co-operation of professors of the philosophical and juridical faculties, as regards physics, mathematics, law, metaphpsics, and other objects, not belonging to the faculty of political economy.

All students who have passed rugularly through the Gymnasia and Lycæa, have a right of admission to the technical high school; and the pupils of the Royal Academy, candidates in forest science, mining, pharmacy, &c., and pupils who have gone through the schools of trade and agriculture of the first class, and have acquired the so-called real objects from a gymnasial teacher, have a similar right. It follows that pupils of the polytechnic school may hear lectures contemporaneously in the high school; but for those who do not take that course, or become students of the Royal Academy, the polytechnic school forms the culminating point of their education, and, indeed, is intended to complete the entire course of technical, combined with popular, instruction. The length of the studies in the high school varies from two to three years, according to the future destination of the student.

Having thus noticed the principles upon which these educational institutions were founded, and the substance of the regulations applicable to them, I proceed to state the condition in which they appeared to be at the time of my visit.

5. The school of trade and agriculture for the circle of Upper Bavaria is established at Munich, in a commodious building in the Damenstiftgasse, under the same roof as the polytechnic school. The rector is Dr. Joseph Bauer, with whom thirteen other masters are associated for the various branches of instruction. At the commencement of the last school-year, on the 29th of October, 1853, there were 359 scholars; at its close, in August, 1854, there were 297. The instruction was distributed into three annual courses, in which the objects taught respectively were as follows:—

First Course.

Religion, two hours in the week; which is taught separately to the Catholic, and to the Protestant scholars, by teachers of their respective confessions.

Geography and history, two hours in the week.
The German language, five hours in the week.
The French language, four hours in the week.
Arithmetic, four hours in the week.
Zoology, four hours in the week.
Drawing, eight hours in the week; viz., the elements of ornamental drawing, and linear drawing with instruments.

Second Course.

Religion, two hours in the week; taught separately to Catholics and Protestants.

Geography, two hours in the week.
The German language and book-keeping, three hours in the week.
The French language, two hours in the week.
Geometry, four hours in the week.
Algebra, two hours in the week.
Physics, elementary, three hours in the week.
Botany, two hours in the week.
Chemistry, two hours in the week.
Technology, or the theory of machinery, two hours in the week.
Theoretical agriculture, two hours in the week.
Drawing, ornamental and linear, six hours in the week.
Embossing in clay and wax, four hours in the week.

Third Course.

Religion, two hours in the week; taught separately to Catholics and Protestants.

Geography, two hours in the week.
Exercises in German style, two hours in the week.
The French language, two hours in the week.
Algebra, three hours in the week.
Descriptive geometry, three hours in the week.
Stereometry and trigonometry, three hours in the week.
Mechanics, two hours in the week.
Mineralogy, one hour in the week.
Chemistry, with experiments, three hours in the week.

The doctrine of trades and manufactures, two hours in the week; comprising sugar, brewing, distilling, baking, glass, porcelain, and metallic manufactures, &c.

Theoretic agriculture, two hours in the week.
Drawing, ornamental and linear, nine hours in the week.
Embossing, four hours in the week.

The age of admission to this school is twelve years, and the majority of the scholars range between the ages of twelve and sixteen years. They are chiefly the sons of tradespeople, inferior officials, and others of the middle ranks in society. The great majority are of the Catholic confession. Prizes are annually distributed to the scholars as the reward of exertion. This school has, I understood, the advan-

tage of occasional access to the collections of machinery and other apparatus belonging to the polytechnic school. The school was considered as flourishing, the numbers having increased. In the school-year 1852–1853 the number of pupils admitted was 339, of whom 280 were remaining at the close of that year.

6. The Royal Polytechnic School at Munich is also commodiously established in the Damenstiftgasse. It is under the direction of the rector, Dr. H. Alexander, assisted by fourteen other professors, a teacher of English, and two subordinate assistants in mathematics and the chemical laboratory. The number of scholars at the opening of the last school-year, on the 3rd of November, 1853, was 304, of which 163 were regular pupils, and 141 were guests (Hospitanten); and of these 248 came from Bavaria, 40 from other parts of Germany, 11 from Switzerland, 3 from France, 1 from Russia, and 1 from Moldavia.

The number of the regular scholars has increased from 154 in the previous year (1852–53) to 163; while the number of the guests (Hospitanten) has fallen from 174 to 141.

The admission takes place on having attained the age of fifteen, and having passed through a trade school or gymnasium. The instruction is distributed over a period of three years, and is divided into three ordinary annual courses, and a special course of engineering. The objects taught were the following:—

First Course.

Mathematics; viz., trigonometry, analytical geometry, &c.

Physics; viz., gravity, light, heat, electricity, &c.

Machinery, and the drawing of machinery, in which a large collection of models is made useful.

Positional drawing.

Descriptive geometry.

Ornamental drawing, in the antique and other styles, and after models.

Religion for the Catholics, in the first and second courses. The like, separately, for the Protestants, in the same courses.

Second Course.

Analytical mechanics; viz., statics and dynamics of solid bodies.

Machinery, and the drawing of it, with the use of the collection belonging to the establishment.

Chemistry, pure and applied.

Differential and integral calculus.

Positional drawing.

The doctrine of construction in building, and that of building materials.

Electro-magnetism, and the telegraph (in the course of 1852–53).

Third Course.

Applied mechanics; geodesy, viz., the use of measuring-instruments, surveying, and mapping.

Machinery, and the drawing of it, with the use of the collection in the establishment.

Analytical chemistry.

Composition in the art of building.

Course of Engineering.

The knowledge of construction in general, and applied specially to bridges, roads, railways, canals, and watercourses.

Construction and designing.

The theory of stone-cutting.

Practical geometry.

Drawing of sections of stones, walls, &c., and modelling of the same in plaster.

Architecture, after the antique.

The range of instruction thus given is, as will have been perceived, extensive, and fully sufficient to qualify all for technical professions, whose object is not to proceed further into scientific theory. The polytechnic students are from the middle ranks of society, and their ages generally between sixteen and twenty-one, though some few are older. Of the whole number of students in the last year, two-thirds were Catholics. Of the poorer students, small stipends are given for their support to the most meritorious; there are forty-six of these stipends, paid partly out of Government funds, and partly out of the revenues of the Circles. The school itself is, as already mentioned, also entirely maintained by the State. It possesses a large and valuable collection of machinery and models, a physical cabinet, a chemical laboratory, a library, and all the requisite materials of instruction. Excursions are made by the pupils, with the professor, for the purpose of the practical examination of objects. I was informed in different quarters that this institution stands in very good repute, and that it owes a great deal to its able and enlightened head, Dr. Alexander.

7. At Nuremberg—the second city in Bavaria in respect of its population* and industrial importance—the technical institutions are similar to those of the capital, and embrace all the requisite instruction from the first elements to the period of admission to an university. In the school-year which closed in the month of August last, the number of pupils in these institutions was as follows:—

I. The Circle, Agriculture, and Trade School.

Agricultural Division.

	Scholars.
The Agricultural School of the Circle	55
The Branch Farming School	6
The Preparatory School	28

Trade Division.

The Trade School of the Circle	195
Guests (Hospitanten)	9
The Elementary Drawing School	287
The Sunday Mechanics' School	1,287

II. The Polytechnic School.

Regular Pupils	64
Guests (Hospitanten)	20
Total	1,951

* 53,638 in the year 1852.

The agriculture and trade school of the Circle is under the direction of Dr. Henry Rose, whose acquaintance I had the satisfaction of making. In the agricultural division there are eight masters and assistants; in the trade division, fourteen; in the elementary drawing school, two; and in the Sunday school, eleven.

The agricultural school of the Circle is intended to prepare young men for managers or farmers, or to be their own economists as proprietors, or for an institution of a higher kind, or the central school of farriery at Munich. There are three courses of instruction, each of the length of one year.

The first course comprises religion (separately to Catholics and Protestants), arithmetic, the theory and the encyclopædia of farming, natural history, drawing, the German language, geography, calligraphy, and the practice of farming on the estates of Lichtenhof and Gibizenhof.

The second course comprises religion, the German language, arithmetic, theoretical farming, and the farming encyclopædia, physics, natural history, drawing, and practical farming on the estates.

The third course comprises religion, theoretical agriculture, agricultural chemistry, farriery, animal anatomy, arithmetic, and geometry, the German language, drawing, singing, and practical farming on the estates.

The pupils are from the middle classes, and their ages vary from fourteen to nineteen and twenty years.

In the branch farming school the instruction is rather less wide in its range, and the preparatory school is, as its name imports, designed to give preliminary instruction to such as are not yet qualified to enter the school itself. The usual age of the pupils is from twelve to sixteen years.

The total number of agricultural pupils, viz., 89, was four less than in the previous year. The pupils of the Catholic confession were 45, and those of the Protestant 44 in number.

The Trade School of the circle provides instruction up to a certain point in mathematics, physics, drawing, and modelling, for youth destined either for business or the service of the State. It has three courses of a year each.

The first course comprises religion (separately to Catholics and Protestants), arithmetic, natural history, drawing, the German language, geography, and French.

The second course comprises religion, mathematics, physics, chemistry, technology, drawing, the German language, history, geography, French, and modelling.

The third course comprises religion, mathematics, descriptive geometry, mechanics, chemistry, mineralogy, drawing, the German language, history, French, and modelling.

The pupils are from the middle classes, and range generally between the ages of twelve and seventeen years, the age of admission being twelve. The majority are Protestants. The number of pupils has increased from 188 in the year 1852-53 to 204 in the year 1853-54.

The elementary drawing schools impart instruction in drawing and modelling to boys who are pupils of the elementary German schools, which is intended to be afterwards followed up in the Sunday mechanics' schools. The Nuremberg school has 287 pupils, which is 14 more than in the previous year.

In the Sunday and holiday mechanics' schools, apprentices and others already employed in trade, and consequently unable to attend any daily school, are taught drawing, modelling, embossing, and en-

graving, as well as arithmetic, geometry, physics, and chemistry. These schools are very well attended, and are generally considered to have had an excellent effect. The number of pupils in the Nuremberg district has increased from 942 in the year 1852-53 to 1,247 in the school-year 1853-54.

The Polytechnic school at Nuremberg is under the direction of the rector, Dr. T. M. Romig, assisted by the other professors, and three subordinate assistants. The entire course of instruction is for three years, and the objects taught in the three annual courses respectively correspond very nearly to those taught in the polytechnic school at Munich, and detailed under that head. The conditions of admittance are also the same. A practical course in the mechanic workshop of the institution is also given, and some articles of machinery are actually made by the pupils. There is also a separate practical course for forming figures in sand, casting, and chiselling, in which the pupils have at present the benefit of Professor Burgschmiet's superintendence. The pupils are generally from the middle classes, and range between the ages of sixteen and twenty-one. Of the whole number, viz., 84, 67 were Protestants and 17 Catholics. The number of pupils in 1853-4 was greater, by seven regular scholars and two guests, than in the previous year. The school possesses a collection of mechanical apparatus in its workshops, and a physical and chemical laboratory.

8. The city of Augsburg* has long been known for its banking and monetary operations, and it has also manufactures of some importance. Its institutions for technical education are similar in their plan and arrangements to those of Nuremberg. They consist of—

	Scholars in 1852–53.	Scholars in 1853–54.
The Mechanics' Sunday and Holiday Schools ..	978	939
The Circle Trade School	230	252
The Polytechnic School	95	79
Number, including Guests or Hospitanten.	1,303	1,270

From which it appears that the School of Trade has increased, while the other two institutions have somewhat fallen off in the last school-year.

On every Sunday and holiday instruction is given in the mechanics' schools, for two hours in the forenoon, in mechanics, physics, chemistry, and geometry; in mercantile accounts and book-keeping; in linear drawing, and free drawing by hand. In the first three, experiments are used; and in general care is taken to ascertain by questions that the pupils remember what has been taught them. In the afternoon, one hour's religious instruction (separately to Catholics and to Protestants) is given to those scholars whom their attendance in the mechanics' school may have prevented from receiving such instruction in their respective parishes. Afterwards, there are two hours' instruction in linear and ornamental hand-drawing, and in embossing. The scholars are either occupied in trade and handicraft, so as to be unable to attend a daily school, or are daily pupils of the elementary German or Latin schools. The Sunday schools are considered to be working well, and to be highly valuable as laying the foundation of the future technical career.

The trade school of the Circle had 238 regular pupils and 14 guests

* Population in 1852, 39,340.

(Hospitanten). The admission is at twelve, and the ages range from twelve to sixteen and eighteen. The payment is only 4 florins, or 8*s.* yearly. There are thirteen regular masters. The scholars are from the middle ranks of society, and the majority are Protestants. Several of them are Jews, who receive separate religious instruction from their own Rabbi. The objects of instruction being the same as in the schools of trade at Munich and Nuremberg, it is unnecessary to reiterate them. Of the three courses, the first is divided into three sections, on account of the great number of scholars inscribed in it.

The polytechnic school at Augsburg is directed by the rector, Dr. Leo, assisted by seven other professors. Its intention is announced to be the formation of technical artists and mechanics for a professional career or the service of the State. The conditions of admittance, as well as the objects of instruction, distributed over three annual courses, are the same as at Munich; and there is a course of practical instruction in the workshops, where models and some articles of machinery are actually made. The school is provided with all requisite apparatus, and with a chemical laboratory.

Several pupils came from foreign countries. The majority of the pupils are Protestants. Five stipends were granted last year to poor pupils, of the value together of 220 florins, which were paid from the funds of the Circle. During the winter months instruction was also given to twenty-five working mechanics in drawing, arithmetic, and geometry, by the professors of the polytechnic school.

The distinction in the objects of the three Bavarian polytechnic schools originally recommended by the Royal founder, viz., architecture at Munich, metallic manufactures at Nuremberg, and textile manufactures at Augsburg, has not been very strictly adhered to in practice; at least, there is no difficulty in obtaining adequate instruction in any of these branches in any one of the schools in question.

9. I have already observed that the polytechnic institutions form the culminating point of combined technical and popular education. But those who desire to proceed further in exact science or in art may direct their course either to the technical high school or the Royal Academy. The former has been described to consist in that faculty in the University of Munich which is devoted to Cameralistic studies, or political economy, with the collateral aid of certain professors belonging to other faculties. In this high school the technical or agricultural student or artist may graduate, if he wishes it, in the same way as the student who has gone through the regular course of *literæ humaniores* in the Gymnasia may graduate in any faculty of the University—in pure science, philology, theology, medicine, or jurisprudence. The Cameralistic faculty gives the degree to the technical student, which stamps him as fully conversant with the theory as well as the practice of those branches of science upon which his career of future usefulness is in any way dependent.

The University of Munich is also an institution which owes chiefly to King Louis its present reputation and flourishing condition. It was removed in 1828 from the provincial town of Landshut to the Bavarian capital, and lodged in a spacious and even magnificent building, where 60 professors, ordinary and extraordinary, deliver their lectures to about 1,700 students. The University library has 160,000 volumes. Every branch of science is taught, except Protestant theology, which is confined to the smaller University of Erlangen. Catholic theology, on the other hand, occupies a prominent place, and a seminary for the peculiar training of priests stands in immediate connection with this university.

In Bavaria the foundation of a classical education is laid in the so-called Latin schools, to which boys are admitted at the age of eight years, and where they are taught the rudiments of Latin in common with other elementary subjects. At the age of about twelve the boy proceeds to the Gymnasium, where he follows a regular course of classics, mathematics, history, &c., upon a fixed system laid down by the Government, which differs little from that adopted in Prussia and the other German States. When the youth has gone through the Gymnasium (the higher stages of which are sometimes called the Lycæum),* he passes to the University, and matriculates there upon the certificate of qualification which he brings from the Gymnasium, making choice of the faculty in which his studies are to be completed, and his degree ultimately obtained. There are in Munich three Gymnasia—the Wilhelminum, the Maximilianum, and the Ludwigs-Gymnasium, which is under the direction of the Benedictine monks. The instruction is divided into four classes. It is left optional to the scholar either to learn the modern languages or not. In the case of Protestant scholars, who in Munich are very few, religion and history are taught them by masters of the Protestant confession. The same provision holds good for Catholic scholars in the Protestant parts of the country.

The Academy of Sciences, originally founded by the Elector Maximilian the Third, has also been reconstituted by King Louis, and placed in immediate connexion with the University, many of the professors being likewise members of the Academy. The sittings are occasionally public; but the proceedings, not being of a popular character, are best known through the transactions which are regularly published. The actual president is the learned De Thiersch. There are various scientific collections, the property of the State, which are always avilable for purposes of study, such as the physical and optical instruments, the cabinet of natural history and petrefactions, the herbarium, the geological specimens, the chemical laboratory, &c. Each of these collections is under the care of a conservator appointed by the Crown. The chemical laboratory is now under the care of the eminent Professor, Baron de Liebig. The new Royal Library, built by King Louis, is generally known for the large and valuable collection of books (about 800,000 volumes) and of manuscripts that it contains, the excellence of its arrangements, and the liberality with which books are placed at the disposition of the public.

10. For the youth who has determined to embrace the career of an artist, the Royal Academy of the Fine Arts offers the requisite means of completing his education. This institution has its origin in the drawing school founded by the Elector Maximilian the Third, and re-established by King Maximilian the First, on the 13th May, 1808; but its present flourishing condition is the work of King Louis, who gave it a new constitution on the 14th of August, 1846. It is at once a society of artists and a school of art.

The instruction given in the academy is both practical and theoretical. The former embraces historical painting, sculpture, architecture, and copper-engraving; the latter, the history of art, anatomy, perspective, descriptive geometry, and shading. The common basis of artistical studies is considered to be drawing after the antique; but especial attention is also directed to the drawing, modelling, and painting after nature. The instruction in historical painting is given

* Philosophical instruction ought properly to begin in the Lycæum. In Bavaria there are several Lycæa, but in the north of Germany they scarcely exist as separate institutions.

in four separate schools, each under the direction of a distinct professor. There are also separate schools of sculpture, architecture, and engraving. Lectures are delivered regularly on the history of art, ancient and Christian, as well as on anatomy, and on the other branches of theoretical knowledge.

The admission to the academy is free both to natives and foreigners, provided they are qualified by the possession of adequate elementary knowledge and facility in the higher branches of drawing, with a proper scholastic education, and a good moral character. The pupils destined for architecture must, if natives, have passed through the polytechnic school; and if foreigners, produce certificates of their mathematical attainments. The candidates execute an experimental performance, upon the result of which their admission depends; and they must further remain a half-year on probation before they are definitively enrolled as pupils. The maximum period of study in the academy is six years, but pupils may leave it earlier if qualified. Diligent and talented pupils, who are natives of Bavaria and poor, may obtain small stipends, besides being furnished gratuitously with models for the cartoons, pictures, or statues which they may execute within the academy.

A general exhibition of modern works of art takes place about every three years, under the direction of the academy. One of these exhibitions was going on when I was at Munich, in a beautiful building in the Corinthian style, facing the Glyptothek. The academy has also the execution, or direction of all public works within the sphere of painting or sculpture. It forms a kind of council to the King in all matters of art.

The staff of the academy consists of a director (at present the celebrated William de Kaulbach), five professors, respectively, of painting, sculpture, architecture, engraving, the history of art, and the technics of painting, with teachers of anatomy and of perspective, descriptive geometry, and shading, and a corrector of the pupils' performances. It has a secretary, an inspector, and proper attendants.

The present number of pupils of the academy is 200, among whom are several foreigners. The expenses of the academy itself for the current year amount, in the whole, to 22,816 florins, or £2,281 sterling —a very moderate sum, considering the efficiency of the institution and the merits of the professors. The budget of the academy, however, in the Government estimates is made to comprise the annual charge of the public galleries, &c., and stands thus for 1854:—

	Florins.
1. The Academy of the Fine Arts - -	22,816
2. Galleries of Art, the property of the State (viz., the Glyptothek, Pinnacothek, New Pinnacothek, &c.) - - -	20,501
3. Working artists - - - -	1,800
4. Allowances and pensions to artists -	6,721
5. Cashier's department - - -	550
6. General Reserve Fund - - -	357
	52,745

Equivalent to about £5,274.

Professor Schotthauer, who was acting in the absence of the director had the goodness to conduct me through the various departments of the academy, and into the studios of the professors, where unfinished works were going on. He pointed out a large collection of

plaster casts belonging to the academy, comprising not only the common antiques, but many scarce ones: the Elgin statues and reliefs from the Parthenon; the Colossus on Monte Cavallo in Rome; the Neapolitan Mercury, &c.; also Ghiberti's doors of the baptistry at Florence; the tapestries with the Vatican paintings of Raphael; and other objects with which the royal munificence has enriched the institution.

11. In the organization of all the establishments above mentioned the hand of the Government is visible, and they stand immediately under its control. But there are other institutions in Munich which the inhabitants themselves have formed for the furtherance of the same objects, such as the Art Union, the Trades' Union, and the like. The Society for the Improvement of Manufactures has, in particular, had a very useful tendency, by the constant communications which it keeps up between the class of artists and that of mechanics. It was founded in 1850, and the chairman is the eminent architect De Voit. The society gives to its members drawings and models for all articles to be worked or manufactured in the department of industry, arranges occasional exhibitions, and publishes a journal. Whilst the artist furnishes the drawings or designs, the artizan is often able to give useful suggestions with respect to the materials best suited for the work; and so both the one and the other is mutually improved. The progress which has been made in casting, and other branches of metallic work—of which the late Munich Industrial Exhibition has furnished evidence—is considered as in some measure attributable to this society, which aims at raising the character of manufactures, by bringing them more closely into contact with the fine arts.

12. The number of artists constantly residing in Munich is very large, and was stated to me at about 800. They are chiefly Germans, but artists from foreign countries are also continually visiting the Bavarian capital. The daily association of these persons with each other could not fail to be attended with beneficial results. Not only is the principle of emulation called into action, but ideas are exchanged in a social intercourse which often lead to the realization of important works. Munich offers, in this respect, on a small scale, the same advantages that Rome does on a larger. Nor are the artists by any means confined to their own set. They mix pretty freely with other classes of society—with learned men, tradesmen, mechanics, and artizans; and hence their tendency has become more scientific than formerly; they have become more disposed to avail themselves of practical science in the execution of artistic works. This improvement may be partly attributable to the influence of the polytechnic school; but I have often heard the opinion expressed, that still more is owing to the favourable social circumstances in which the artist is placed when residing at Munich.

As a school of pure art, there is no place out of Italy which holds out so many attractions to the student. He finds in the Glyptothek, the Pinnacothek, and the other Royal collections, the best opportunities of copying from the antique, and of forming his knowledge of the painting and sculpture of more modern times. He sees around him magnificent public buildings, and churches whose architecture is only surpassed by the beauty of their internal decorations. The statues of Schwanthaler show him that great sculptors can also be produced in our own age; and the frescoes of Cornelius, of Hess, of Schnorr, and of Kaulbach, reveal to him a new form of art not possessed by the ancients, which the genius of Catholic Christianity alone could conceive and accomplish. The new German school of painting is essen-

tially Catholic. It is peculiarly at home in Munich, where everything breathes the Catholic spirit, and where in consequence there is that perfect harmony between religion and art, which in Protestant countries must always be so difficult (if indeed it is possible) to realize. These great advantages the Bavarian capital affords to the artist in the prosecution of his career. And if he is successful, and gives evidence of more than ordinary talent, he may feel sure of the Royal patronage being liberally extended to him. King Louis's example descends in this respect to his successor, and the future Sovereigns of Bavaria will have before them an easy task. They will have little to create; they have only to pursue the road which King Louis's genius has thrown open. The undertaking was a laborious and a very costly one; for it is estimated that the late King expended upon buildings and works of art in Munich (including the Glyptothek Collection, which he formed when Crown Prince, and the Walhalla Temple on the Danube), at least 130,000,000 florins, or £13,000,000 sterling. The Bavarians have at times complained that the Royal profusion pressed hard upon them; but they now readily acknowledge the splendid result, and are proud of the widely-spread fame of their most artistic city.

13. In conclusion,—recapitulating the causes which have chiefly promoted the progress of Practical Science and of the Fine Arts in Bavaria, they appear to be as follows:—

1. The laying an early foundation, by beginning to teach drawing and other branches of useful knowledge, in the elementary German as well as in the Latin schools.
2. The excellent system of the Sunday and holiday schools, where drawing and other useful objects are taught to apprentices and others, who cannot attend any daily school.
3. The graduated and systematic plan on which the education begun in the elementary schools is carried on in a continued chain through the schools of trade and agriculture, to the polytechnic, and the technical high school in the University.
4. The extraordinary advantages which Munich offers to students in art, not only by admitting them to the Academy, but by placing them in the midst of the finest artistic works, and enabling them to associate constantly with artists, and with scientific and practical men.
5. The absolute direction and control exercised by the Government over all educational institutions, from the lowest to the highest, and whether in the department of literature, pure science, practical science, or fine art. Neither the clergy nor corporate bodies have the right, more than any individual to meddle with the public education; but it is the business of the Government to conduct it in conformity with the physical and moral wants of the people, and whilst furnishing them with the means of making their own career in life, to take care that they are properly imbued with religious and moral sentiments, and with a right sense of their duties as subjects and members of society.

I have, &c.
(Signed) J. WARD.

The Earl of Clarendon, &c., &c., &c.

No. 3.

Mr. Lowther to Lord Stanley.—(*Received October* 16.)

My Lord, *Berlin, October* 11, 1867.

WITH reference to your Lordship's despatch to Lord A. Loftus of the 17th of July, I have now the honour to inclose to your Lordship my report upon the system of Technical Education in Prussia, to which are added various publications containing information of interest.

I have the honour also to inclose a report, by Mr. Hertslet, upon the technical schools at Konigsberg; a report of the Committee of the Verein of German Engineers upon the organization of polytechnic schools, with a precis; some publications upon technical schools for women, as well as copies of statutes, regulations, and reports of establishments for agricultural education.*

I have, &c.

(Signed) WILLIAM LOWTHER.

Inclosure 1 in No. 3.

Report upon Technical Schools in Prussia.

I. THE nature of the technical education in the whole of Prussia is various. It is partly carried on by means of establishments founded by the Government, or State, and partly by establishments which the towns have founded out of their own incomes, which entirely or partially support them, and partly by establishments which have been founded by Industrial Companies—such as the Polytechnic Company, the Artisans' Union (Handwerker Verein, &c.). The last two classes of establishments must have licences from the State. In this class of establishments, the object first of all was to promote industry and technics in general, but it afterwards became an object to elevate certain defined branches of industry; and, more particularly for this purpose, courses of particular studies were established at the large academies, such, for example, as at the Royal Trade Academy (Königliche Gewerbe Academie), for machine building, for shipbuilding, for chemical technology, and by special lectures upon dyeing and printing of stuffs, upon weaving and spinning, upon photography, upon agricultural machines; or schools have been opened for certain technical branches, such as weavers' schools, dyers' schools, &c.

All such establishments exist on their own account, and are exclusively devoted to technical purposes. The number of the various establishments of this kind is, for the three grades (see question 3), very considerable.

For the lowest grade there are from 200 to 300 establishments; for the middle grade, about 240; and for the highest grade there are two establishments. A third is in process of being founded and made.

II. With *all* technical branches of trade, but more particularly and specially with the building trade (masons' and carpenters' work), weaving, dyeing, machine building of all sorts, carpentering, shipbuilding, chemical industry, and others.

The instruction of different technical establishments of instruction

* See Appendix, pages 293 and 361.

in Prussia tends directly to the promotion of these technical branches, while indirectly all other branches profit by it. The way in which this takes place is explained in answer to question 8.

III. In order to answer this question, one must first look at the different kinds of schools which exist. A pamphlet by Dr. Grothe on this subject is herewith enclosed.

The amount of people to be technically educated are therein characterized and divided as—

1. Workmen and artizans.

2. Possessors of smaller factories, mills, brickyards, &c.

3. Possessors of larger factories and smelting works, and engineers who work in them, teachers of technical science, and civil engineers. The following establishments, companies, and promotive unions, are used by the class 1, which comprises, paid labourers, artisans of all kinds:—

1. Sunday schools, for the further education (fortbildung) of apprentices of various industries.

2. Evening schools, for the same purpose.

These schools, which are also sometimes combined, are arranged for pupils who have their time occupied in learning other industrial trades, and who have no other spare time for learning than the hours of the evening and Sundays.

3. Schools of the Unions of Artisans (Handwerkervereiner).

Their hours for teaching are also in the evening, and on Sundays. They are open to all artisans and workmen, old and young, masters, pupils, and apprentices.

4. *Builders' Schools* (Bangewerkenschülen). These establishments, during the winter months, offer an opportunity to building artizans (carpenters, masons, roofers, potters, &c.) of giving their time to the acquirement of theoretical knowledge and skill. All building artizans are admitted. These schools, which are established in many towns of Prussia, have been very successful.

5. Weaver's Schools, the object of which is to make pupils acquainted with everything belonging to weaving and its duties; and the

6. Dyeing Schools are also for the same purpose as regards dyeing and printing of stuffs (Zengdruck); but of the above-named kind of schools, that which has the first place as regards industry, and belonging to the first class, are the

7. Foreman's Schools. These schools are established for builders of mills, sinkers of wells, makers of conduits, spinners, weavers, manufacturers of machinery, and have for object to educate and prepare the pupils to such an extent that they can perform the offices of foremen in factories of this kind, *i.e.*, as superintendents of divisions in such factories. According to a pamphlet herewith enclosed, there were eight day industrial schools in Hamburg for young people, who had an elementary education, and who will now give a year to the exclusive acquisition of more important industrial knowledge. A similar institution exists in the now Prussian town of Frankfort-on-the-Maine. Besides, attempts are made to form the first class of *technics* (techniker, persons versed in technical knowledge), by giving them free access to technical collections and collections of patterns. These collections exist in Berlin at the Royal Industrial Academy (Königliche Gewerbe Academie, which has been newly classified and arranged by the director, Mr. Nottebohm), at Brieg on the Oder, at Frankfort-on-the-Maine, in Cassel, in Hanover (this is a very ample collection, divided into eight sections, showing the different manu-

factures), in Cologne, in Görlitz, in Chemnitz, and in Hamburg. These collections or exhibitions are to familiarize them with the new products, fabrics, machines, and apparatuses, and to show them how progress is made in manufactures, &c.

The workman and artisan can copy the objects exhibited in these collections, and can make use of them in his trade. In order to show the workmen at the same time how to treat objects in an artistic manner, and in order to promote art in trade, a company has latterly been formed in Berlin to found an industrial museum (Gewerbe Museum), whose chief object is the above. A copy of their statutes is herewith enclosed. To this museum is to be added an educational establishment especially for workmen and artizans, which is to give them a theoretical as well as an artistic education. This is to be done partly by lectures upon general subjects. This establishment is to be opened on the first of November.

In all these above-named establishments workmen and artisans are to be perfected in elementary knowledge (reading, writing, and arithmetic). This elementary knowledge, however, is obligatory in Prussia, and, almost without exception, every Prussian citizen is able to read and write. Thus all workmen and artisans who frequent these establishments bring with them a sufficient preliminary knowledge.

With regard to the second division of the people who occupy themselves with science (technik), it will be necessary to see what establishments are open to them for the perfecting of higher technical knowledge. To this division belong the owners of small factories and of moderate extent, such as grinding mills, saw mills, dyeing establishments, weavers, spinners, brick-makers, glass-makers, potters, nail factories, ultramarine factories, chocolate and chicory factories, &c. Further, members of the middle burgher class who wish to benefit their artisans, such as locksmiths, carpenters, carriage builders, lamp makers, &c., or there are all branches of trade and of manufactures which require also more knowledge with the general advance of industry. For example, a lamp-maker must combine with his mechanical knowledge a knowledge of a chemical and physical nature. He must also have some knowledge of art. The master weaver must also have a knowledge of chemistry, of physics, of machinery, &c., &c., in order to carry on his factory with due attention. To this division also belong members of the class with means, who have had a much more extended education. For the complete education of this class as regards technical knowledge there are hardly any others than the Prussian Provincial Industrial Schools (Preussische Provinzial Gewerbe Schulen) of which more details will be given in answer to question 9. In a lower degree the technical knowledge of this class is promoted by the particular schools (Fach Schulen) for weavers and dyers, and a number of native private establishments, besides private establishments, for technical knowledge, as that of Gerding in Göttingen, and Uhland in Mittweida in Saxony.

Lastly there is the class of persons called technically educated (Technisch Gebildetem), who attain to the highest education in this direction. To this class belong not only proprietors, but also engineers of machine building establishments, large chemical factories, soda factories, gas works, sugar refineries, ship building establishments, railways, large weaving establishments, spinneries, dressing yards, dyeing places, &c., &c., and also the teachers for the middle and highest places for technical education.

In order to attain this highest education (to which only those can be admitted who have had the previous education mentioned or

characterized in questions 7 and 8), the following places are provided:

1. The Royal Gerwerbe Institut, now Royal Gewerbe Academie, in Berlin.

2. The Royal Polytechnic School in Hanover.

3. The Gewerbe Institut at Aix la Chapelle, now in course of construction.

In the neighbouring countries there are:

4. The Polytechnic School at Dresden.

5. Colleginin Carolinum or Ducal Polytechnic School at Brunswick.

There are also higher Polytechnic teaching establishments at Carlsruhe, Zürich, Vienna, Prague, and in Bavaria.

Then there are other establishments which take a middle place between these establishments and the provincial industrial schools, such as—

1. The Royal Higher Industrial School at Cassel.

2. The Grand Ducal Technical School at Darmstadt.

3. The Academical and Real Gymnasium at Hamburg.

4. The Higher Industrial School at Frankfort-on-the-Maine.

IV. 1. These institutions are partly, quite supported by State means, *i.e.*, by the Government, as for example the Royal Gewerbe Academie at Berlin, the Polytechnic School at Hanover, at Dresden, at Brunswick, &c.

2. And partly by money out of the funds of the provincial coffers, with assistance from the State, as for example the Polytechnic School at Aix la Chapelle, and a number of provincial industrial schools, &c.

3. And partly by municipal funds, with assistance from the State, as is the case with the provincial industrial schools, &c.

4. And partly by only municipal means, as is the Gewerbe Schule at Berlin, Elberfeld, Frankfort-on-the-Maine, Hamburg, Lubeck, Chemnitz, the weaver's schools at Mühlheim, Elberfeld, Crefeld, &c. All towns possess "*further*" *educational schools* (Fortbildungs Schulen), builders schools, evening and Sunday schools.

5. And partly by polytechnic unions. To this class belong the educational establishments the Berliner Handwerker Verein (Berlin Artisan's Union), the Hanoverian Gewerbe Verein, and others. Contributions from inheritance are generally used for stipends, &c.

V. This varies very much. It is necessary in order to answer this question to take the separate grades of education in review.

A.—Lowest Grade.

1. The school of the Berliner Handwerker Verein was in 1865 attended by about 1,300 students (apprentices, journeymen, masters, workmen).

2. The Bangewerke Schule (builders' school) at Dresden by 98 students.

3. The Werkmeisters' School (foremans' school) at Chemnitz by 60 students.

4. The Sunday, evening, and fortbildungs schools are established in about 200 Prussian towns, as far as can be ascertained there were 3,000 scholars who attended these establishments; it is not putting the figure too high when it is stated that the establishments named were attended by from 6,000 to 7,000 scholars belonging to the class of workmen and artisans.

B.—Middle Grade.

1. The provincial industrial schools (Gewerbe Schulen) in Prussia are now 30 in number, and were attended by 60 scholars, giving a total of 1,800 scholars. There are some of these schools which were attended by 130, and others by 30 to 40 scholars.

2. The municipal gewerbe schools are attended on an average by 700 to 800 scholars.

3. The gewerbe schools of Frankfort-on-the-Maine, which have lately belonged to Prussia, were attended by about 200.

The result of the total attendance at the schools for the middle grade may be taken at 2,000 to 3,000.

The attendance at schools in the States bordering on Prussia, and which have been founded on the Prussian principle, is as follows:

1. Gewerbe Schule at Gotha about 200 scholars.
2. Gewerbe Schule at Lübeck about 200.
3. Gewerbe Schule at Chemnitz about 200.

C.—Highest Grade.

1. Gewerbe Academie at Berlin about 440.
2. Polytechnic School at Hanover about 450.
3. Higher Gewerbe Schule at Cassel 140, making a total of 1,000 to 1,100.

In the neighbouring States—

1. The Brunswick Collegium Carolinum 150.
2. The Technical School at Darmstadt about 100.
3. The Higher Polytechnic School at Dresden about 330, giving a total of about 550 to 600 scholars.

As a general answer to question 5, without including the scholars who are taught at private establishments, there are of—

I. Grade (workmen and artisans, &c.) per annum about 7,000 scholars or pupils in Prussia and the neighbouring small states.

II. Grade (middle class)—

1. Per annum about 2,800 to 3,000 in Prussia.
2. Per annum about 500 in the neighbouring small states.

III. Grade (highest education)—

1. Per annum about 1,000 to 1,100 in Prussia.
2. Per annum about 550 to 600 in the neighbouring small states.

The sum total of those Prussians who have had a technical education may be taken at 11,000 out of all classes engaged in business.

VI. The instruction costs:

1. In the scholastic establishments of the great Berliner Handwerker Verein according to subjects in which they are instructed; for writing, arithmetic, German language, geometry, laws of projectiles, and singing, per quarter 7½ silver groschen (9*d.*); for drawing and architectural drawing, decomponrien (unravelling woven things), modelling, and mercantile arithmetic, per quarter 15 silver groschen (1*s.* 6*d.*); for bookkeeping and monetary knowledge 25 silver groschen (2*s.* 6*d.*); for drawing, machinery, and stenography, per quarter 1 thaler (8*s.*); for French and English languages 1¼ thaler (3*s.* 9*d.*).

2. Schools (Bangewerker Schulen) relating to building receive per annum for all branches of the instruction given 14 thalers (£1 10*s.*). when the instruction is given only in the winter six months then they are paid 5 thalers (15*s.*)

3. Special department (Fachschulen) schools (weavers, dyers) receive 20 thalers (£3) per half-year.

4. Sunday and evening schools, as well as the completing schools (Fortbildungs Schulen) are paid 1 to 2 thalers (3*s.* to 6*s.*) for six months.

5. The foreman's schools are paid on an average 6 thalers (18*s.*) per half year.

From this statement it will be seen that in all these scholastic establishments which are to be of use to those engaged in the lowest grade of technical employment, the payment to be made is calculated according to the means of the workmen and artisans, &c., who frequent them, not exceeding 6 thalers (18*s.*), that is 1 thaler (3*s.*) per month. It must also be stated that members of the Gewerbe Vereins, Handwerker Vereins, &c., give lectures gratis to the handwerker.

II. For the instruction given in the schools in which the middle grade is educated, the fees are as follows:—

1. Royal Provincial Gewerbe Schulen.

a. Such as have two courses (cursus) in two years, 6 thalers (18*s.*), in Grandenz and Erfurt per annum; 8 to 16 thalers (£1 4*s.* to £2 8*s.*), as is the case also in Aix la Chapelle, Treves, Halberstadt, Danzig, &c.

b. Such as have three years courses at these schools, the prices paid are:—

I. Classe,	one year,	thalers 8—14	(£1 4*s.* to £2 2*s.*).
II. Classe	,,	,, 12—16	(£1 6*s.* to £2 8*s.*).
III. Classe	,,	,, 16—20	(£2 8*s.* to £3).
3 Classes	in three years	36—50	(£5 8*s.* to £7 10*s.*).

The school money, however, in the Provinzial Gewerbe Schulen is regulated according to the circumstances of the locality. In Danzig, for example, it must be much higher than in the smaller provincial towns, but the fee to be paid to these establishments never exceeds 20 thalers (£3) per annum.

2. Municipal Gewerbe Schulen receive generally 16 thalers (£2 8*s.*) for school money per annum.

3. The private establishments for tuition at Mittweida, Frankenberg, and Göttingen, arrange their fees according to another point of view; they will be found in the enclosed prospectus. The higher grade of the Polytechnic establishments for education makes the following arrangement with regard to the school fees exacted.

1. Royal Gewerbe Academie in Berlin.

1. For every weekly hour of instruction there is to be paid per six months three-quarters of a thaler (2*s.* 2½*d.*).
2. For taking part in practical exercises in the Chemical Laboratorium, there is an extra to be paid of 25 thalers (£3 15*s.*) per six months.
3. For taking part in the practical works in the machine-making workshops, one lesson per week during the half-year, there is an extra charge of 1 thaler (3*s.*).
4. For taking part in the works in the photographic atcher once a week, per half-year, an extra charge of 2 thalers (6*s.*).

2. Polytechnic school at Hanover. Fee for the single course of study per annum, 3 to 16 thalers (9*s.* to £2 8*s.*).

3. Higher Gewerbe Counte, at Schule. Fee per half-year, 12 to 28 thalers (£1 16*s.* to £4 4*s.*).

4. Collegium Carolinum, at Brunswick.

1. Fee for half-year for all branches of education for matriculated scholars, 18 thalers (£2 14*s.*).

For the use of the chemical laboratorium, an extra of 6 thalers 20 silver roubles (£1).

2. Fee for the non-matriculated students, about 18 thalers (£2 10*s.*), and for the use of the chemical laboratorium, 10 thalers 20 sqr. (£1 12*s.*)

5. Technical school at Darmstadt, fee per annum, 30 to 40 florins, equal to 17 to 24 thalers (£2 11*s.* to £3 12*s.*).

6. Higher Polytechnic School at Dresden.

1. For natives, 26 to 42 thalers (£3 18*s.* to £6 6*s.*).

2. For foreigners, 36 to 50 thalers (£5 8*s.* to £7 10*s.*).

On looking, therefore, at this list of fees, it will be found that—

1. The lowest grade (workmen, artisans, foremen, &c.) pay in schools established for them, 2 to 6 thalers (6*s.* to 18*s.*) per half-year.

2. That the middle grade (proprietors of factories, directors of works, &c.) pay between 6 to 8 thalers (18*s.* to £1 4*s.*) per half-year.

3. That the higher grade (engineers, candidates for places as teachers, &c.), pay between 25 and 60 thalers (£3 15*s.* to £9) per half-year.

To the second part of this question may be answered that there are attached to many of these establishments free places and stipends. Particularly endowed in this respect is the Royal Gewerbe Institut, now the Royal Gewerbe Academie, at Berlin, where about 150 students enjoyed stipends and free places, as may be seen in the annexed statutes of the Gewerbe Academie, page 10, under the head of "remarks." They consist of—

a. A remission of the fee for instruction.

b. The adjudication of a sum of money, about 200 thalers (£30) yearly. Similar stipends and free places exist at Dresden, Cassel, Hanover, Brunswick, and other places.

c. The directors of various scholastic establishments for technical education, are allowed to send pupils who show some talent, to take part in the instruction given, without having to pay the fees.

d. Manufacturers and masters of establishments often send gifted workmen, pupils, foremen, &c., to be educated at the technical scholastic establishments at their own expense.

e. The State (Government) does the same in exceptional cases.

f. The Handwerker Verein, the Polytechnic Verein, the Gewerbe Verein, &c., do more in often providing young men who are anxious to improve, with the means of obtaining a technical education.

VII. 1. For the lowest grade, the following qualification is necessary for any one who wishes to be admitted into the industrial schools, and knowledge of:—1, writing; 2, arithmetic; 3, reading; 4, correct orthography. This knowledge is obtained in the common schools and burgher schools, which every Prussian is obliged to attend, so that in fact every Prussian is in possession of this knowledge, man as well as woman.

2. For the second grade it is necessary to have a certificate of having had an education equal to that required in the class "tertia" (third) of a Prussian gymnasium, or of a Prussian *Real* schule (in a Real schule instruction is given chiefly in natural science and philosophy, Latin and English, but *not* in Greek), or superior burgher school, that is, a knowledge of—

a. Natural philosophy (Naturkunde).

b. Geography and history.

c. Complete knowledge of German literature.

d. Mathematics (geometry, algebra, up to the equations of the first grade and proportions).

e. Arithmetic, including all kinds of book-keeping.

f. Knowledge of English and French.

g. Religion.

2. Should the scholars not have provided themselves with such a certificate of qualification, then they have to pass an oral or written examination in the above named subjects.

3. Those who by a course of some years practical education, have qualified themselves for the post of masters or journeymen, demand admission, are not examined with the same severity, but the principle subjects are necessary.

4. Every one demanding admission has to bring a certificate of his moral behaviour, which is obtained from the police authorities, and certified by them.

3. In order to be received in the technical educational schools of the higher grade, the following is necessary :—

1. Gewerbe Academie at Berlin.

1. A certificate of attainment (Zenguiss der Reife) from a provincial industrial school, or from a real school, or from a gymnasium, *i.e.*, the applicant must have attained to the highest class in these schools, and he must have gone through an examination which gives him a discharge by the State (Staats, enttassung Prüfung).
2. The person demanding admission, seeing that he must have had some practical knowledge, can have himself examined at a provincial gewerbe school.
3. The higher polytechnic school at Hanover. The requirements are somewhat less than those at the Gewerbe Academie in Berlin. The same is the rule at the higher polytechnic schools at Aix la Chapelle, Brunswick, Dresden, &c.

In these establishments people are also admitted, under the name of "hospitanten," who can attend what lectures they please. But they must also be provided with a certificate similar to that required for the higher education mentioned above under 1 and 2. These "hospitanten" pay higher fees.

The students remain at the establishments of the lower grade as long as they please; a workman's means do not often allow him to continue remaining there; on an average they frequent the establishments from one to two years, sometimes three years. Each course of the building schools generally extends over two to three winter half-years; that of the foremen's schools, one year and a-half. Of course the establishments only receive those people who have been practically at work for some years, otherwise the instruction given there would not have any object.

The scholars for the middle grade follow a course (cursus) from two to three years. (In the municipal gewerbe schools, however, classes are often admitted for general and language instruction, in which case the course lasts five or six years).

The higher polytechnic establishments have chiefly courses which last three years. The age of the people to be admitted does not in any grade of the technical instruction go lower than 15 years, the age at which they are confirmed. In every grade, however, there are people who are above 25. For the middle grade an age of 15 years is necessary, for the higher grade one of at least 17 years.

The control over the scholars has no reference to their religious

conduct, but only to their moral conduct, and is a mild one, because in scholars of that age reason and good behaviour may be looked for. In general rules as to control and conduct are the same everywhere, like that in the statutes of the Berlin Gewerbe Academie, page 9, herewith enclosed.

The different creeds are not in general separated, only in establishments where special religious instruction is given, as for example, in some provincial gewerbe schulen where different creeds receive instruction apart in those creeds.

The scholars never live in the institutions, except in private establishments at Göttingen. Frankenberg, and others, where it is possible, but not compulsory.

Women never take part in the technical instruction given at the above named institutions.

There have very lately been some institutions founded for the occupation of women technically; but these have been more for the purpose of giving them an education in commercial knowledge than a technical education, though the latter is not excluded. Such establishments exist now in Berlin, Hanover, and Leipzic, which were attended by 50, 79, 104 students in 1866. A prospectus of an institution of this kind at Berlin is herewith annexed, it is under the direction of Professor Clément and there are seven teachers who are occupied there. Dr. Grothe lectures there upon chemistry, physics, and technology. These establishments have for object to prepare women for, places in counting-houses, telegraph-offices, modelling, wood-carving, drawing, post-offices, &c. The effect of this beginning of such places of education for technical education for women has been most successful.

The institutions above mentioned have almost all been technical; but there are in Prussia and in other parts of Germany a large number of scholastic establishments which are for the purpose of giving an industrial education. These are partly private schools or municipal schools, very seldom State or Government schools. To these belong—

a. { 1. Real Schools (Real Schulen).
{ 2. Higher Burgher Schools.

b. 3. Commercial Schools.

Those named under *a* are much extended, their number is about 180 and they combine.

Elementary knowledge, scientific knowledge, tuition in languages, special tuition in commerce, given in from six to ten classes. The establishments called commercial schools, Handels schulen, desire chiefly to give only a mercantile education, combining with it tuition in technology.

Languages—Natural Philosophy.

Some which are connected with technical establishments of education teach commercial knowledge. Thus it is with some of the places of education for the lowest grade of technical education where tuition is given in book-keeping, knowledge of goods, laws of exchange, as in the establishments of the Berlin Handwerker Verein (vide plan of lectures of Berlin Handwerker Verein).

Scholars of the middle grade of education have sometimes instruction given them in commercial knowledge, as is the case at the gewerbe schule at Frankfort-on-the-Maine, at Chemnitz, at Hamburg, &c.

No such departments exist in the higher grades at Berlin, but they

do at Hanover, Dresden, &c., and they are to be introduced at Berlin soon.

The provincial gewerbe schools in Prussia do not give any such instruction.

VIII. In the first grade of technical education the following:

1. Evening schools, Sunday schools, and perfecting schools.

1. Mathematics.
   a. Algebra and arithmetic (algebraic reckoning up to equations of 1 and 2 grades).
   b. Gravitation (planimetry and geometry).
2. Mechanics and mechanical technology (solidity, motion, and other principals, application of machine power).
3. Physic (natural philosophy) fundamental doctrine.
4. Chemistry (fundamental doctrine).
5. Chemical technology.
6. Knowledge of implements.
7. Knowledge of wares.
8. Drawing.
   1. Architectural drawing.
   2. Machine drawing.
   3. Free-hand drawing.
   4. Geometrical drawing (drawing fundamental proportion doctrine).
9. Modelling in clay, wax, wood, &c.
10. Book-keeping, letters, commissions in business, contracts, &c.
11. Languages, English, French, and German.
12. Stenography.
13. Gymnastics.

The three last are not always introduced. The instruction given is, if possible, arranged according to the grade of education of the pupil in language and composition, and with the exception of drawing and modelling and mathematics, is kept to a general education.

2. In the building schools (banzewerk schulen) the subjects of instruction are:—

1. German language.
2. Arithmetic.
3. Lessons in proportions.
4. Algebra.
5. Geometry.
6. Knowledge of constructing buildings.
7. Fundamental doctrine of projection.
8. Physic (natural philosophy).
9. Elements of knowledge of force.
10. Elements of knowledge of heat.
11. Agricultural building.
12. Ornamental knowledge.
13. Drawing of architecture.
14. Free-hand drawing.
15. Modelling in clay.

For further details see report upon the Bangewerken Schule of Berlin.

In some building schools a knowledge of commercial affairs is also added, as in Hamburg.

3. Forman's schools.

1. Mechanics.

2. Knowledge of machinery.
3. Drawing of machinery.
4. Building of mills.
5. Measuring of ground (surveying).
6. Spinning and weaving.
7. Mechanical technology.
8. Mathematics.
9. Laws of projection.
10. Architectural knowledge.
11. Physics (natural philosophy).
12. Drawing.
13. Book-keeping.
14. German language.

For details see statutes of the Foreman's school at Chemnitz.

B. For the middle grade the following objects are required:—

1. Prussian provincial gewerbe schools, on an average.

I. Course.

1. Mathematics	8	Stunden.*
2. Chemistry	6	,,
3. Physics	5	,,
4. German	3	,,
5. Arithemetic	4	,,
6. Drawing	4	,,
7. Architectural drawing	4	,,
8. Machine drawing	4	,,
9. Modelling	1	,,
Weekly	39	

II. Course.

1. Mathematics	4	Stunden.
2. Chemistry	4	,,
3. Physics	4	,,
4. Chemical technology	1	,,
5. Physical technology	1	,,
6. German	3	,,
7. Mechanics	2	,,
8. Knowledge of machinery	2	,,
9. Construction of buildings	1	,,
10. Knowledge of materials	2	,,
11. Drawing	10	,,
12. Modelling	2	,,
13. Chemical analogy	2	,,
Weekly	38	

for details see plan for founding institutions for instruction for preparation for higher technical instructive institutions by Dr. H. Grothe.

2. The other establishments for instruction for the middle grade are nearly similar to above.

C. The objects of the higher technical establishment of instruction are the following:—

* Stunde is either hour or lesson, the lesson never exceeds an hour.

1. Gewerbe Academie at Berlin. The instruction in this establishment is divided into two divisional departments—

I. One general technical.
II. One general technical, for
a. Mechanics.
b. Chemistry and smelting.
c. Ship-building.

The single lectures are upon :—

I. In the general technical department—
a. Complement to general knowledge of figures; higher equations.
b. Spherical trigonometry.
c. Differential and integral calculations.
d. Analytical statics and mechanics.
e. Theory of mechanical effects of heat.
f. Descriptive geometry, and application of it to perspective construction of shadows and lithotomy.
g. Special inorganic chemistry.
h. Physicks.
i. General experimental chemistry.
k. General knowledge of constructive building.
l. Knowledge of simple parts or machinery.
m. Drawing.
n. Modelling.

II. In the divisional department :

1. For mechanicians—
a. Theory of solidity of buildings, and of parts of machinery; calculations with regard to buildings put together; theory of Arone's counterpoise; and (Futter mauern) building of sluices.
b. Motion of water and air in natural and artificial directions; adapted hydraulics; theory of heating apparatuses.
c. General theory of machines; their resistance and regulation, particularly the theory of hydraulic movements and machines.
d. Calculations with regard to simple parts of machinery; general direction of machines.
e. Special knowledge of machines—power machines.
f. Mechanical technology.
g. Chemical technology.
h. Practice in plans of parts of machines.
i. Practice in plans of power machinery.
k. Practice in plans of machines and factory grounds.
l. Plans and drawings of such artistic forms as can be used for iron when wrought.
m. Mathematical foundation of the most important physical laws.

2. For chemists and people employed in smelting—
a. Special inorganic chemistry.
b. Special organic chemistry.
c. Mineralogy.
d. Geognosy.
e. Metallurgic chemistry.
f. Chemical technology.
g. Special knowledge of machines and machine power.
h. Practice in planning chemical works.
i. Practical studies in a laboratorium.

3. For ship-builders :

a. (up to *i*) as in II. 1.

k. Drawing of vessels and parts of vessels.

l. Art of ship-building, general, deplacement and stability, first part, hydrostatic calculations.

m. Art of ship-building; knowledge of stability, second part, theory of sailing and steam vessels, general principles with regard to form of vessels ; knowledge of construction of wooden and iron vessels.

n. Practice.

o. Planning and calculating of vessels.

2. At the Polytechnic School at Hanover lectures are given upon mathematics, physical science (chemistry, physics, chemical technology, mineralogy, geology, &c.), drawing of various kinds, mechanics, and knowledge of machinery, building (waterworks, art building, road making, railways, bridge building) right to build, English and French.

3. The Polytechnic School at Dresden. The lectures are the same as those named under 2, with the addition of

Instruction in surveying,
German literature,
Knowledge of fuel and heating,
Modelling,
Planning of machinery,
Astronomy,
Saxon legal knowledge,
Knowledge of banking,
Bookkeeping,
Stenography,
Gymnastics.

4. The Brunswick Collegium Carolinum, besides the above-named, gives instruction in the art of building, on the subject of building materials, pharmacy, and lectures upon matters relating to forests, agriculture, legal doctrine, national economy, &c. This establishment, besides having in view technical and educational purposes, has the character of a small university for the country.

There is a particular academy in Berlin for the building trade, of which the statutes are herewith annexed. The same is the case with persons connected with mines, smelting houses, forges, and foundries, who can get a superior finishing education at the Berg Academie (Mining Academy). Thus the Gewerbe Academie is chiefly employed for the finishing education of machine engineers, technics, ship-builders, &c. The highest finishing education in all polytechnical matters can be obtained at the

1. Gewerbe Academie,
2. Bau Academie,
3. Berg Academie,

a preparatory education for which can be got at

The Gymnasia,
Real Schulen,
Provinzial Gewerbe Schulen.

There are also particular schools for miners and smelters, called the mining schools (berg schulen), and these are established in those parts of the country where mining is going on to a great extent, in order that the students may work practically during the summer; in winter they study theoretically. The students belong to the practikar (practical people), and, according to their education, belong almost entirely to the middle grade.

1. In the schools of the lowest grade, such as the elementary schools, it is always accompanied by questioning.

2. In schools of the middle grade by lectures, joined with frequent accurate repetitions.

3. In schools of the highest grade it is almost entirely academical, that is, in the form of lectures. At the end of six months repetitions take place.

Education in drawing is given by means of models, and copies put before them; in chemistry by experiments and lectures, as also in physics.

1. Pupils of the first grade, such as workmen, artizans, and the two do not go together, as the education offered is specially for the purpose of perfecting practice.

2. In the cases of pupils of the second middle grade, about half of them have, before attending the establishment, worked practically, and they wish to acquire a theoretical knowledge.

3. The same is the case with the higher grade.

The Gewerbe Institut at Berlin offers an opportunity of acquiring a practical education. For mechanics there is a large workshop, where there are not only machines and tools for use, but where machines are made and castings taken.

For technikers there is a very large laboratorium, where all sorts of trials take place in chemistry, &c. Practice is also exercised in photography, dyeing, weaving, spinning, and cotton-printing.

Excursions are also made to the large factories, which are to improve the knowledge of such matters. There are also studien reise (journeys for the sake of study) made every year by the pupils to those parts of the country where factories exist.

IX. The studentship at the Bau Akademie and the Berg Akadamie releases the student from the obligation to pass an examination of fitness for Government service (staats cheitst). This is not the case with the Gewerbe Akademie; but latterly an attempt has been made to obtain this privilege by a society of Prussian civil engineers. Annexed is a document upon the subject. Having attended and passed an examination before leaving a provincial gewerbe schule, gives a claim to military service of only one year. There are no other special privileges attached to these studentships, and there is no special education of this kind necessary in Prussia for admission to the exercise of any particular trade.

X. The teachers prepare themselves for giving instruction in the technical schools of the middle and lower grades by taking a studentship or direction of a gymnasium, or Real Schule Kursus, and then entering the Gewerbe Academie, studying there diligently three years. They then remain there as candidaten and assistanten, and after having undergone a Government examination, become teachers. Latterly the following course has also been pursued when a student qualified to attend the Gewerbe Academie has attended it for three years, and then goes over to the practical part (praxis), and has remained there for some years as competent engineer, he can become a "privat docent" at the Gewerbe Academie. He does not then receive any fixed salary from the state, but he gets the fees due to him from those who attend his lectures, &c. The teachers of the lowest grade of technical education are very often manufacturers and private persons, who often give instruction gratis. There are some who are teachers from other schools, or those who have obtained their knowledge in the manner described above. A list of the teachers at the Berlin Handwerker Verein is annexed.

There are attached to almost all the institutions for technical education, libraries, which can be made free use of by the students.

XI. The advantage obtained is, that there has been a very good class of workmen established, which *thinks*, and has a knowledge of the things they are required to make, and consequently comprehends more easily. The class of workmen has become also better mannered, more civilized and refined. The middle class of tradespeople has been able to raise the profession; it has been able to carry into effect all repairs in factories, and to arrange and direct them in such a way that they were cared for in the most convenient manner. It has been able to introduce new methods in manufactories, &c. The highest education of German engineers has caused the profession to be very much sought after, on account of its extensive and fundamental knowledge. By means of all these circumstances Prussian establishments like Prussian industry, have been able to raise themselves.

XII. The most favourable, as proved by the very great use made of all the technical places or establishments of education of all grades, &c., is proved by the necessary enlargement of existing, and formation of *new* establishments. The workmen feel the influence of the knowledge they have acquired, and are anxious to attend the lectures at the vereins (unions), which conduce to show the workman the importance of theory. From 10,000 to 12,000 men attend the lectures of the Handwerker verein at Berlin alone.

Looking at the result given in answer to Question V, that about 11,000 men receive a technical education annually in various grades of knowledge, it will easily be understood that the effects of these technical establishments of education are generally recognised.

Inclosure 2 in No. 3.

Extract from page 6 of Pamphlet über Gewerbe Schulen und Gewerblechen Museen.

(Translation.)

PLAN of a gewerbe schule proposed by the committee, having for object to give those who are engaged in industrial pursuits an opportunity of acquiring knowledge and readiness of such matters as shall advance them in their calling.

Three principal divisions:—

1. Sunday and evening schools for such scholars who can make use of a few hours during the week, and who may have a few hours at their disposal during their hours of study, or whilst they are employed in other matters.

2. The winter building schools for those occupied in building, who during the winter months can employ their time exclusively in perfecting themselves in theoretical knowledge and skill.

3. Daily industrial schools for young people who have left the elementary school, and are in the position before they commence their studies as artisans, to give up their whole time during one year to acquire a preliminary industrial knowledge.

Inclosure 3

General Survey of Plan of

FIRST

Names of Establishments.	Number of Schools in Prussia.	Number of Scholars or pupils.		Amount of School Money per half year.	Amount of Teachers employed per Establishment.
1. Evening, Sunday, and finishing schools.	about 200	1,300 Berlin	about 6,000 to 7,000.	about 6 thalers (18*s.*)	4 to 10 Berlin 20
2. Schools connected with building Baugewerkern shulen.				about 5 thalers (15*s.*)	6 to 10
3. Foreman's schools ...	1	69		about 6 thalers (18*s.*)	7
4. Weaver's schools	3	96		about 20 thalers (£3).	4
5. Dyer's schools	2	45		about 20 thalers (£3).	4

SECOND

Names of Establishments.	Number of Establishments.	Number of Pupils per Establishment.	Amount of fees per half year.	Number of Teachers per Establishment.
1. Provincial industrial schools. Royal establishments.	30	about 60 (1,800)	about 3 to 25 thalers, see answer to question 6 (9*s.* to £3 15*s.*)	3 to 6
2. Municipal industrial schools.	?	700 to 800	(16*s.*) about 8 thalers.	5 to 12
3. Mining schools	...	...	...	...
4. Industrial schools at Frankfort-on-the-Maine	1	200	...	9
5. Weavers and dyeing schools.	5	145	20 thalers (£3).	4

THIRD

Names of Establishments.	Number of Establishments.	Number of Students.	Amount of Fees.	Number of Teachers.
1. Gewerbe Academie (Bau. academic.	2 in course of construction at Aix-la-Chapelle.	about 440	about 50 thalers (£7).	24
2. Building academie ...	...	...	...	...
3. Mining academy (Berg. Academie).	...	...	...	...
4 Polytechnic School at Hanover.	1	about 450	about 40 thalers (£6).	27
5. Higher industrial School at Cassel.	1	140	12 to 28 thalers (£1 16*s.* to £2 4*s.*)	14
6. Higher Polytechnic School at Dresden.	1	324	20 to 30 thalers (£3 to £4 10*s.*)	26
7. Collegium Carolinum at Brunswick.	1	160	18 to 28 thalers (£2 14*s.* to £4 4*s.*)	about 40

in No. 3.

Industrial Schools in Prussia.

GRADE.

Schools for.	Names of Establishments.			Knowledge necessary for admission.
	General.	Special.	Exceptional Schools.	
All classes of workmen, artisans, masters, apprentices, and pupils.	1. Sunday schools. 2. Evening schools. 3. Finishing schools. Admittance and attendance from all classes and corporation of the above grade.	Building schools for builders, masons, carpenters, roofmakers, &c. Weavers' schools, Spinners' schools, dyers' schools, for weavers, spinners, and dyers.	Foreman's schools for millers, brewers, builders of mills, spinners, &c. Commercial course.	Elementary knowledge, reading, writing, arithmetic.

GRADE.

Schools for.	Names of Establishments.			Knowledge necessary for admission.
	General.	Special.	Exceptional Schools.	
People of the middling education, small owners, of simple factories, mills, higher artisans class, and directors of the above factories.	1. Provincial gewerbe schulen. 2. Municipal gewerbe schulen. Admittance according to conditions named in last column.	1. Weavers' schools. 2. Dyers' schools. 3. Commercial schools. 4. Mining schools.	Gewerbe institution for girls for finishing education in commerce and trade.	Certificate of tertia (third) class of a gymnasium real school, commercial school. Higher burgher school, a viva voce examination.

GRADE.

Schools for.	Names of Establishments.			Knowledge necessary for admission.
	For Machine Building, &c.	For Building.	Mines and Foundries.	
Persons of the highest education, directing engineers, civil engineers, owners of large multilateral factories, teachers of technical knowledge, &c.	1. Gewerbe Academie. 2. Gewerbe institut at Aix-la-Chapelle.	1. Building academy (Bau. academie), Berlin.	1. Mining academy (Berg. academie) Berlin.	Having worked at a gymnasium higher real school, provincial gewerbe school, mining school, or an examination which proves having had this higher education.
	Schools which unite these three Faculties. 1. Higher Polytechnic School at Hanover. 2. Do. do. Dresden. 3. Do. do. Brunswick.			

Inclosure 4 in No. 3.

Plan of Lectures at the Berlin Handwerker Verein, for January, February, March, 1867.

Date.	Monday.	Date.	Wednesday.	Date.	Saturday.	Date.	Sunday.	Remarks.
January 7	Against keeping off illnesses.	2	Literature.	5	Physiology.	6	Calling and position of the female sex.	These are chiefly regulations for the guidance of the teachers.
January 14	Physical science.	9	Physiology.	12	History.			
January 21	Chemistry.	16	Trick and Romance.	19	Lyrics.	13	Goethe's Herman and Dorothea.	Lectures begin at 8¼ p.m. and are not to last more than 45 minutes.
January 28	Chemistry.			26	Laws of exchange.	20	?	
						27	Natural history.	Monday evenings from 8.45 to 9.
February 4	Lectures upon health.		On the Wednesday evenings from the 23rd January to 27th March, a series of lectures open to men and women. Members admitted gratis, and can introduce two female belongings. Members of other handwerker vereins pay one silver groschen (1¼). Those who do not belong to the Verein pay 2½ silver groschen (3rd).	2	Catalogue of library.	3	Care of health.	
February 11	? Physical science.			9	History of art.	10	Upon Grabbe and Hebbel.	Practice in chorus singing in parts.
February 18	Technology.			16	Public law.			
February 25	History.			23	National rewards.	17	Sketches made on journey.	Smoking, playing, and reading of newspapers not allowed in the lecture room during the lectures.
						24	History.	
March 4	Technology.			2	Keeping off diseases.	3	Physical science.	
March 11	Physical science.			9	Paper money.	10	Care of health.	
March 18	Technology.			16	Cultivation of industry.	17	Technology.	
March 25	History.			23	Education in the Verein	24	Chemistry.	
				30	Physical science.	31	Physical science.	

NOTE.—The names of the lecturers have been omitted, but can be seen in the original.

FREE INSTRUCTION.

1. Caligraphy and reading, Friday evenings, 8 to 10.
2. Correct writing and reading, Monday and Tuesday evening, 8 to 10.
3. German, first course (cursus), words and sentences; reading, Tuesday and Friday evening, 8 to 10.
4. German (second course), letter writing, Monday evenings, 8 to 10.
5. Literature, with declamation, Wednesday evenings, 8 to 10
6. Arithmetic (first course), the four first rules, with known and unknown quantities, simple rule of three, fractions and decimal fractions, Tuesday and Saturday evenings, 8 to 10.
7. Arithmetic (second course), rule of partnership and discount, Thursdays, 8 to 10.
8. Arithmetic (third course), square measurement, Wednesdays, 8 to 10.
9. Drawing and architectural drawing, Sunday, 8 to 12.
10. Drawing of machines and projections, Sunday, 9 to 12.
11. Knowledge of projections, practice in, Wednesday evening, 8 to 12.
12. Modelling, Tuesday evenings, 8 to 10.
13. Geometry, Thursday evenings, 8 to 10.
14. Simple book-keeping, and laws of exchange, Sunday mornings, 8½ to 10.
15. Double book-keeping, Sunday morning, 10 to 11½.
16. French, Tuesday and Friday evenings, 8 to 10.
17. English, Tuesday and Friday evenings, 8 to 10.
18. Singing (second division), Monday evening, 8 to 10.
    Ditto (first division), Wednesday evening, 8 to 10.
19. Stenography, Sunday, 12 to 1.
20. Patterns, Sunday, 9 to 12.

(For prices of instruction given, see Answer to Question 6, in report.)

Plan of Lectures at the Berliner Handwerker Verein, for April, May, June, 1867.

	Date.	Monday.	Date.	Wednesday.	Date.	Saturday.	Date.	Sunday.	Remarks.
April	1	Literature.	3	German life in London.	6	The unity of natural forces or agencies.	7	Don Juan Fabel, translation of that work.	Chiefly refer to the duties of the teachers.
	8	Anatomy of the intestines.	10	1st vol. Faust.	13	Manufacturing towns in France.	14	Palm Sunday.	On Wednesdays women are admitted, when the entrance for members is gratis, each member may bring two women.
	15	Do.	17	On system of German emigration.	20	Astronomy.	21	Easter day.	
	22	Easter day.	24	Security of Insurance Companies.	27	Domestic economy.	27	On the agate stone.	Members of other societies pay 1 silver groschen.
	29	Life of Wedgwood.							
May	6	Laws of life and death.	8	Severance of the Netherlands from Spain.	4	Natural history.			Persons who do not belong to the societies pay $2\frac{1}{2}$ silver groschen.
	13	Literature.	15	Egmont and Orange.	11	Man and wife, relations of.			
	20	The Paris Exhibition.	22	Women and works of art.	18	Parents and children, relations of.			
	27	Works of art.	29	Women and literature.	25	Raphael.			
June	3	Domestic economy.	5	Lecture on music.	1	Raphael.			
	10	Physiology.	12	Venice.	8	Lessing.			
	17	Life of Arkwright.	19	Natural history.	15	Education.			
	24	Natural history.	26	The clock.	22	History.			
					29	Medicine.			

Plan of Lectures at the Berliner Handwerker Verein, for July, August, September, 1867.

Date.	Monday.	Date.	Wednesday.	Date.	Saturday.	Date.	Sunday.	Remarks.
July 1	Mr. Franz Dunker.	3	History of lace manufacture.	6	Charity fête.	7	A charity fête, at which the wives of the members may attend.	Do not differ from those in other tables.
July 8	Statistics.			13				
July 15	Messrs. Breleck, Born and Eberts report from Paris.	10	History of religion.	20	Physiology.			
		17	Domestic economy.	27	Literature.			
		24	Technics.					
July 22	Health.	31	Commercial history.					
July 29	Do.							
August 5	Domestic economy.	7	Natural history.	3	Political economy.			
August 12	Natural history.	14	Natural history.	10	Weaving.			
August 19	Literature.	21	History of religion.	17	Do.			
August 26	History, and mode of gas-lighting.	28	Duties for maintenance of health.	24	Domestic economy.			
				31	Commercial history.			
September 2	On chemistry.	4	On health.	7	Zimmermann and village history.			
September 9	Do.	11	Natural history.					
September 16	Literature.	18	History.	14	On education.			
September 23	History.	25	Statistics.	21	Natural history.			
September 30	Value of machinery.			28	Physiology.			

Inclosure 4 in No. 3.

Report by Mr. Consul Hertslet.

KÖNIGSBERG.

I. There exist at present in Königsberg :—

1. The Provincial School of Industry (Gewerbe Schule).

2. The School of Artificers and Tradesmen (Künst und Handwerks Schule).

3. The Sunday School of the Society of Industry (Gewerbe Gefellschaft).

II. Particular schools for single professions or manufactures do not exist at Königsberg.

III. The Provincial School of Industry (Gewerbe Schule) instructs engineers, technical persons, and masters in architectural building, &c. The school for artificers and tradesmen instructs apprentices and scholars in building and industrial arts. The Sunday school instructs apprentices and workmen in the common professions.

IV. The expenses of the School of Industry are borne by the State and the community in equal proportions. The expenses of the School of Artificers and Tradesmen by the State alone, and the Sunday School by the Society of Industry of the province of Prussia.

V. The yearly average number of scholars is :—

For the School of Industry 40 to 50.
" " Artificers 350 to 400.
" " Sunday School 80 to 100.

VI. At the School of Industry the charge is rix thaler 24 (£3 12*s.*) per annum. The instruction in the other school is gratis, with free places in cases of necessity. Stipendial exhibitions for three or four scholars exist with the Society of Industry and the Polytechnical Society. Private manufacturers do not defray any expenses.

VII. A previous practical education is not required at the School of Industry, but is requisite for the other schools. The School of Industry gives weekly 36 hours of instruction; the other schools only the Sunday or a few evenings on usual days for a few weeks. The usual time requisite is :—

For the School of Industry 3 to 4 years.
" " Artificers 2 to 3 years.
" " Sunday School 1 to 2 years.

The ages for the three classes are :—

For the School of Industry 15 to 21 years.
" " Artificers 15 to 18 years.
" " Sunday School 14 to 17 years.

The schools are for males.

VIII. The grade of education generally required for admission into the School of Artificers and Tradesmen, and likewise for the lowest class in the School of Industry, is having passed through a common elementary school; for the second class of the School of Industry the scholar must have been in the third class, and for the upper class in the same school, he must have passed the first class of a Gymnasium. The subjects of instruction in the School of Industry are elementary and higher mathematics, mechanical, physical, chemical, and architectural lessons, mineralogy, and drawing.

In the School of Artificers and Tradesmen : drawing and modelling in clay or wood.

In the Sunday School: writing, arithmetic, and the acquirement of a business style.

IX. The certificate of having passed the School of Industry liberates the students from undergoing a master examination in any particular profession, and confers on them the right of visiting the higher professional academies at Berlin.

X. The teachers are appointed by agreement. An official Board of Commissioners examines the teachers for the School of Industry. The teachers at the School of Artificers are artists and architects who have passed an examination. The teachers at the Sunday Schools are likewise teachers at the usual other daily schools.

XI. The advantageous influences of these schools are evident in all branches.

XII. The results which the School of Industry brings about are beyond the level of what is required for an average master of a trade or profession, and for this reason the School is not at present appreciated by the masses as it should be. The frequenting of this school is looked upon as a requirement for persons who intend to become architects. The Sunday School is considered to be a necessity for such as intend to become smaller masters or professionists in country places.

GENERAL REMARKS.

Reports on this subject are not published.

East Prussia is chiefly an agricultural province, and manufacturies, beyond sawing and grinding mills, are an exceptional branch. Parties wishing to rise in these or any other branches of living have to finish their education and pass examinations at Berlin. All such schools are for males and are under complete Government control.

(Signed) W. J. HERTSLET.

Königsberg, September 2, 1867.

No. 4.

Mr. Jerningham to Lord Stanley.

My Lord, *Stockholm, November* 30, 1867.

I HAVE the honour to inclose a copy of a letter which I have received from Mr. Doria, Secretary of this Legation, transmitting his report on education in this country, drawn up according to your Lordship's instructions.

I have, &c.

(Signed) G. S. S. JERNINGHAM.

Inclosure 1 in No. 4.

Mr. Doria to Mr. Jerningham.

Sir, *November* 30, 1867.

I HAVE the honour to inclose to you for transmission to Lord Stanley my report on education in this country, which I have drawn up in conformity with his Lordship's instructions, conveyed in his despatch of the 17th July last.

In addition to my report I have the honour also to forward the accompanying papers,* containing the information I have been able to obtain from the Swedish Government on the particular points specified in the inclosure to Lord Stanley's despatch, which the Royal Commissioners are desirous to obtain, together with reports from the inspectors of schools in Norway and Sweden relative to the two countries.

I have, &c.

(Signed) WM. DORIA.

Inclosure 2 in No. 4.

Report by Mr. Doria, Her Majesty's Secretary of Legation, on Education in Sweden and Norway.

Stockholm, November 30, 1867.

THE state of public instruction in Sweden may be divided into two periods, that is, the period before and after the year 1842.

In 1809, when a change in the form of Government took place, which admitted the nation, through its representatives in the Diet, to a participation in the Government of the country, a lively interest arose in all that concerned the question of public instruction. Under the old system many persons were educated who were themselves opposed to the general development of knowledge.

King Charles John, in 1820, at the desire of the members of the Diet, enacted that only persons who were fitted for the office should be appointed as schoolmasters.

In the year 1829, the Diet proposed that no one should be admitted to the office of clergyman, unless he was also capable of giving instruction in the schools; the proposal, however, was rejected. Up to that time instruction was given by persons ill fitted for the occupation, and the schools were moved from village to village. In order to remedy these evils, Count de la Gardie and the Archbishop Rosenstein established the society of "Vexel Unterricht," or mutual instruction. The object which the society had in view was to procure teachers, and to establish schools, to which such large sums of money were collected.

In 1830 a seminary for the education of school teachers was established in Stockholm, to which was added a school for children of both sexes. In this school the pupils in the seminary were to perform the office of teachers. In process of time 171 teachers were educated at this seminary, and were sent into the provinces. Up to the year 1842, 482 new schools were established in rural districts, and 95 in towns in Sweden. During the same period several private schools were also established. The most worthy of mention was the Elementary School, at Stockholm, and the Hill School, intended to introduce a new system of education.

In the year 1846 a law was passed to allow half of the amount levied as a poll tax to be applied to the support of the national schools. The sum levied on each person is 40 ores (about 6*d.* sterling) on every man, and 20 ores on every woman. In cases where this amount was insufficient for the expenses of the schools, the parish was called upon to make up the deficit.

Since the year 1863, half the expenses of the national schools are borne by the parish; the other half is supplied from the States Cassè.

If a parish is unable to establish a school, the Government con-

* See Appendix, page 180.

tributes the deficiency. If a parish also is prepared to afford two-thirds, the Government contributes the remaining third of the expense towards any necessary improvement in the school.

Petitions regarding the establishment of schools must be presented to the Chapter of the Cathedral.

When persons are desirous of dedicating themselves to the duties of school teachers, they are admitted to the seminaries for teachers, of which establishments there are nine in number, seven for male and two for female teachers. For indigent persons at these seminaries the Government has assigned an annual sum of 30,000 rix thalers. No person, however, is permitted to obtain an annual allowance, exceeding 150 thalers, and that only during three years. Persons presenting themselves as candidates for teachers must be furnished with proper certificates, that they can read and write, that they are capable of teaching the catechism, Bible history, geography, the history of Sweden, arithmetic, as far as the rule of three and fractions, with natural history. They must, moreover, be able to instruct in simple choral singing, and gymnastics.

If children are, from poverty or mental incapacity, unable to acquire these different branches of knowledge, the instruction must in that case be confined to reading, writing, and arithmetic.

The instruction given in the schools ought to have for its main object the mental development of the children, who should be made to understand what they read on religious subjects before they take their first Communion; such instruction should be based on Luther's First Catechism, which ought to be learnt by heart, but which ought in the first instance to be fully explained to the children. Morning and evening prayers are to be read daily in school. The clergyman should pay attention to see this rule enforced.

An annual examination takes place at stated times, when certificates of their progress and conduct are given.

Children are sent to school at 7 years old, and continue to attend until the age of 15. As education in Sweden is compulsory on all classes, children who are not taught at home, and who receive no instruction at a private, must be sent to the national school. When guardians are too poor to afford to send the children to school, they can obtain assistance from the poor-rate. It is incumbent on every householder to see that the children of the servants in his employment are sent to school. If the guardians should oppose the children being sent to school, the master, after giving due notice, can take the children from under his care, but the guardian will legally be obliged to pay for the education of the children.

The parish and the school directors fix annually the time for instruction. The daily hours of school are not to exceed six, and between each hour a short respite from study is allowed the children.

Teachers, if unfit for the performance of their duty, are liable to be discharged by the directors. If the teachers are incapacitated by age or sickness from the discharge of their duties, a pension may be granted to them by the parish; for this purpose a fund of 120,000 rix thalers has been assigned by Government, from which a certain percentage is deducted for widows and children.

The general inspection of schools is entrusted to the Bishop or the Chapter.

In 1865 new regulations were issued with regard to the seminaries for teachers, by which a course of instruction for two years in the following branches of knowledge was enjoined:—Bible history and Luther's Catechism, explanation of the Psalms, the main Articles of

Belief of the Church, exercises for reading and writing the Swedish language correctly, arithmetic, geometry, history of Sweden, geography, with the use of globes, physical sciences, caligraphy, singing, gymnastics, sword exercise, with a knowledge of gardening and the art of teaching.

In connection with every seminary for teachers is a national school, in which the young teachers are afforded the opportunity of learning how to teach.

On the clergy of the diocese devolves the duty of inspecting schools. The seminary for teachers in Stockholm was opened in the year 1861, and that in Skara in 1866. In both of which a head master and five ushers are appointed. There is also a seminary for female teachers in Stockholm, where there are three male and three female teachers, with a lady superintendent.

In these two seminaries there were 134 pupils in the beginning of this year. The French, English, and German languages are also taught in these seminaries, and classes of thirty children are attached to them in order to provide the teachers opportunities of practising in the art of teaching. In Gottenberg and Nordköping a seminary for teachers has been established by private enterprise, where many efficient teachers have been educated.

National school inspectors were appointed in 1863, of which there are now thirty-nine in number. Their duties consist in visiting and inspecting both public and private schools, and in making reports to the Government Board of Education, and also in conveying to the schoolmasters and directors the instructions which the Board of Education from time to time may wish to have carried out. These reports are required to be sent in three months after the inspection has taken place. It is their duty also, in cases where immediate reform is desirable, to apply to the Chapter of the Diocese. The inspectors made a report in 1865 for the years 1860 to 1863, and again for the three years 1864 to 1866. The latter I have obtained, and it will accompany my present report on education. From it may be gathered what progress has been made with regard to national schools during the last few years. Much yet remains to be done in the less populous parts of Sweden before the desired end can be obtained. It should be mentioned that the clergy have shown great zeal and energy in promoting the development of education. Parishes also have readily made sacrifices in order to construct schools and in raising subscriptions for the teachers, while an earnest desire is acknowledged to exist generally to promote education, and readiness to meet the expenses thereof. With regard to teachers, many persons are of opinion that it would be advantageous if national schools were supplied with more female teachers, than it has hitherto been possible to obtain. Their opinion is based on the supposition that women are more adapted than men to instruct children, that they more easily gain their confidence, and that women have a more cheerful manner of imparting knowledge to children. Women, also, can live better on small means than men, and the salaries of teachers fixed by Government must of necessity be small in so poor a country as Sweden. Finally, the occupation of schoolmistress would offer to unmarried women a means of procuring a livelihood, who now find difficulty in supporting themselves.

With regard to national schools, it appears that in Sweden, as in many other countries, except in Holland and Belgium, the religious instruction is given to the children by the national schoolmasters, although under the superintendence of the clergy when required. The clergy have no direct participation in the instruction afforded in the

national schools, although they assist at the annual examinations, both with reference to the religious as well as to the secular attainments of the children.

When a child leaves school the parson commences to instruct it, previous to confirmation. The parson is also president of the school, and watches over the instruction given. By this means in Sweden, and also in Norway, every endeavour is made to give a Christian character to the instruction, and also to ground it on the religion of the Established Church. In Catholic or Protestant countries, where the large majority of the people are of one creed, it is natural that the wishes of the majority should be attended to in matters concerning the Church and education, which is the case in Sweden. As shown by documents published by the Statistic Office, in 1865, there are 4,200,000 inhabitants, of whom not more than 433 are Catholics; 183 English Episcopal, 25 French Reformed Church, with 1,216 Jews.

Persons who do not profess the Lutheran form of faith, although in other respects enjoying perfect religious liberty, are not admitted as members of the Diet, nor can they be appointed to certain Government offices. They have their own special schools, which are maintained by themselves, but they must nevertheless contribute to the support of the national schools, although deriving no benefit therefrom, nor do they receive assistance from the Government towards the maintenance of their own schools, the expenses of which are heavy owing to the small number of their community. From the official returns published in 1866, it appears there were 6,875 Baptists in Sweden who form a community of their own, and are not allowed a voice in the government of the national schools. As no law exists to prevent secession from the Established Church of Sweden, the number of Sectarians is increasing. In 1840 a Committee was appointed to inquire into the religious instruction given in schools, and the Committee proposed that the religious instruction should be entrusted to the clergy; the proposal however was rejected, although the teachers, who are very ill paid, cannot be expected to possess the requisite knowledge for such instruction. It was contended on the other hand that the clergy had not leisure to attend and teach in the school, having their parish duties to attend, which occupied them, besides having to prepare the young for their first communion. The King therefore withheld his consent to the proposal. Many objections which were then raised against this proposal are no longer in existence, on account of the new parish law, by which the "Communal Styrelse" or municipality has now to take upon itself some of the duties which formerly devolved upon the clergyman; for example, the collecting rents on church property and handing them to the clergyman, and letting Church lands not occupied by the clergyman; this and other changes effected by the new law give more time to the clergyman, so as to enable him at least for two hours in every week to attend and instruct the children in Luther's Catechism.

Inclosure 3 in No. 4.

Answers in reply to the "Information sought by Her Britannic Majesty's Government relative to Technical or Industrial Education in Sweden."

SWEDEN.

I. The general tendency of the technical or industrial education imparted at certain schools and colleges in Sweden, is to promote the

acquirement either of the elementary, theoretical and practical knowledge, or of the scientific education necessary to the proper exercise of industrial pursuits.

There are schools for the promotion of technical industries in general, and schools specially connected with mining, ship-building, &c.

In the former class may be included:—

a. Sunday and evening technical schools; such exist at Eskilstuna, Norköping, Malmö, Orebro, Boräs, and other places.

b. Elementary technical schools, established in the above-mentioned towns, and also the Industrial School at Stockholm, and the School of the Industrial Society at Gothenburg.

c. The Technological Institution in Stockholm, and Chalmers' Industrial School at Gothenburg.

To the latter class belong:—

a. The Elementary Mining School at Filipstad, and the Mining School at Fahlum (the latter is to be amalgamated with the Technological Institution in Stockholm).

b. The Ship-building Institution at Carlskrona.

Each of the above-named institutions is complete in itself, though some of them are also intended as preparatory schools for those who propose to enter higher educational establishments. Thus the Sunday and evening schools are preparatory establishments for the elementary technical schools, and these again, for the Technological Institution in Stockholm, or its counterpart, Chalmer's Industrial School at Gothenburg.

II. Although several of the before-named schools are more or less connected with various industries—persons who have already entered on industrial pursuits being preferred as students in the Sunday and evening schools, and also in the Industrial school in Stockholm, and the School of the Industrial Society at Gothenburg—yet it is only the mining schools and the ship-building institution that are, strictly speaking, connected with particular industries. The students at these institutions are instructed by their teachers not only in the school-room, but are, also, taught the practical performance of their particular industry; the students of the mining schools by being employed at the iron works, furnaces, and mines, and the students of the ship-building institution by working in the ship-building yard.

III. All persons connected with industries, whether masters, foremen, or journeymen, enjoy access, on prescribed conditions, to the before-mentioned schools, yet the Sunday and evening schools are chiefly adapted to journeymen; the elementary technical schools to such as desire to obtain more complete knowledge of subjects connected with industrial pursuits, so as to fit them (after having likewise acquired practical skill), advantageously to fill the post of foremen; and the Technological Institution, together with Chalmers' Industrial School, are best suited to the wants of persons seeking to acquire that scientific education necessary for technical professions. The mining schools are intended to form skilled mining engineers and managers of iron works; and the chief purpose of the Ship-building Institution is to train ship-builders and foremen for ship-building yards.

The other two of the above-mentioned establishment, viz., the Industrial School in Stockholm, and the School of the Industrial Society at Gothenburg, unite the characteristics of Sunday and evening schools and of elementary technical schools, so that their purpose is of a twofold nature.

IV. Sunday and evening schools are generally supported by the parish in which they are established, without any contributions from

the public funds. The Sunday and Evening Technical School at Eskilstuna, the chief aim of which is to encourage the iron and steel manufactures in that town, is the only school of the kind that enjoys a grant from the State; this grant amounts to 5,000 "riks dollars" annually. The Industrial Society's School at Gothenburg is likewise entirely supported by the community and by donations from private persons.

The elementary technical schools, after the respective localities in which they are established have defrayed the expense of building and fitting up the school premises, receive annual grants from the State to meet the salary of the teachers, the purchase of instruments, and to cover other necessary expenses connected with the management of the schools. The grants allowed each of these schools amount, at present, to 12,000 riks dollars annually.

The Industrial School in Stockholm, for which a building has lately been erected by the aid of grants both from the State and from the city of Stockholm, has also obtained an annual grant from the State amounting to 79,000 riks dollars, the school receiving, in addition to this, towards its expenditure, contributions from the City of Stockholm, the Swedish Industrial Society, and from the bequests of private persons.

The Technoligical Institution is supported solely by grants from the State, which, at present, amount to 55,500 "riks dollars" annually.

Chalmers' Industrial School was founded, and is supported to a great extent by the interest derived from a fund bequeathed by a private individual, but it also enjoys a grant from the State, amounting, at present, to 21,500 riks dollars per annum.

The Ship-building Institution is supported by a State grant, amounting, at present, to 7,000 riks dollars per annum.

The Mining School at Tahlun is supported partly by the State and partly by the association of iron-masters, the annual grant from the State amounting, at present, to 9,700 riks dollars.

The Elementary Mining School at Filipstad is supported entirely by the Association of Iron masters.

V. The number of pupils in the school term 1865—1866 was as follows:—

a. In the Sunday and evening schools at Norköping, Malmö, Örebro, Boras, and Eskilstuna (these being the only schools of the kind that return official reports of their transactions	633
b. In the elementary technical schools	192
c. In the Industrial School in Stockholm	1346
Of which 856 males and 490 females.	
d. In the School of the Industrial Society at Gothenburg	300
e. In the Technological Institution	100
f. In Chalmers' Industrial School	107
g. In the Mining School at Fahlun	20
h. In the Elementary Mining School at Filipstad	20
i. In the Ship-building Institution	25

VI. The instruction given at all the before-named schools (the pupils of which reside out of doors) is either altogether or very nearly free. With the exceptions hereinafter mentioned, it is only at the elementary technical schools that a trifling entrance fee is paid, amounting to 4 riks dollars 50 ore, or to 10 ricks dollars at the most. The exceptions are two of the elementary technical schools, the Indus-

trial School in Stockholm, and the Elementary Mining School at Filipstad, at which the following fees are paid: at the elementary technical schools 18 riks dollars 75 ore at the most each term, at the industrial school 50 ore a month, and at the elementary mining school 50 riks dollars per annum.

Students not possessing the means of paying these fees are exempted from them, unless they are defrayed by the private generosity of manufacturers, which is very often the case.

VII. The qualifications for admission to the respective schools are: good character and a certain age. At the Sunday and evening schools candidates must be 12 years, at the Industrial School in Stockholm 13 years, at the elementary technical schools, the ship-building institution, and Chalmers' Industrial School 14 years; at the Technological Institution 16 years, and at the mining schools 18 years of age.

The term of instruction at the Sunday and evening schools, the Industrial School in Stockholm, and the School of the Industrial Society at Gothenburg, may vary in length according to circumstances. It must, however, extend over one year at least, if the pupil wishes for a certificate of examination. The term of instruction at the elementary technical schools is fixed at three years, at the mining schools at two years, at the Technological Institution and Chalmers' Industrial School at three years, and at the Ship-building Institution at four years.

All the pupils are males, with the exception of those of the Industrial School in Stockholm, where female pupils also receive instruction, although at separate hours. The ages of the pupils vary considerably above the before-mentioned minimum.

VIII. The general knowledge required for admission to the Sunday and evening technical schools, the Industrial School in Stockholm, and the school of the Industrial Society at Gothenburg, consists in being able to read and write with facility, and, if the pupil profess the Christian faith, the possession of a tolerable degree of religious knowledge. For admission to the elementary technical schools an acquaintance is required with the elements of the grammer of the Swedish and German (or the English) languages, of history and geography, especially with regard to Sweden, and a familiarity with the four rules of arithmetic, as well as vulgar and decimal fractions, and the first elements of geometry.

For admission to the Ship-building Institution about the same amount of information is required, but with the extension of arithmetical knowledge to single and double rule of three, and the substitution of the English grammer in the place of the German.

The degree of knowledge required at the Technological Institution and at Chalmers' Industrial School is further extended, in addition to arithmetic, to six books of Euclid, stereometry, equations of the first and second degrees in algebra, the first elements of plane trigonometry and the use of logarithms, together with physics, chemistry, and mechanics. The student is also expected to be able to express himself plainly and with tolerable correctness in Swedish composition, and to translate with facility easy German authors.

For admission to the Mining School the knowledge required is nearly similar to that required at the last-named institutions, only that a more extensive course of study in chemistry, physics, and mechanics, must have been pursued, or otherwise that the candidate must have passed the mining examination at the University.

The subjects of instruction at the Sunday and evening schools consists chiefly of arithmetic and geometry, drawing, both linear and free-hand, mechanics, physics, and chemistry, together with the appli-

cation of these sciences to such branches of industry as are particularly carried on in the locality where the school is situated, modelling, book-keeping, and orthography.

The form of instruction consists of lecturing, accompanied, when requisite, by experiments, the exhibition of drawings, models, raw materials, and manufactures, of examination, and of work and practice executed by the pupils under the superintendence and directions of the teachers.

The course of instruction imparted at the elementary technical schools is as follows:—

1. Mathematics, comprehending arithmetic, elementary geometry, two degrees of algebra, together with the theory of logarithms and series, and of plain trigonometry. 2. Linear drawing, in plane and elevation, and drawing in perspective of tools, machines, buildings, &c., chiefly from models. 3. Free-hand drawing, chiefly of ornaments, utensils, and other objects applicable in industries, mechanical trades, and architecture; modelling in clay and wax, of such ornaments, figures, &c., as are adapted to develope taste and artistic skill in the practice of particular industries. 4. Mechanics, both theoretical and applied to machinery, &c., connected with manufactures, agriculture, and other industries, comprehending, also, the elements of architecture, and mechanical technology, with a knowledge of the most important raw materials connected therewith, and manufactured products of such raw-materials in different stages of completion. 5. Experimental practice in the laboratory of the school. 6. Physics, both general and applied to industries, elucidated by experiments. 7. Chemistry, general and applied to industries, elucidated by experiments and materials, and by practical experiments in the laboratory of the school. 8. Botany and zoology, with reference particularly to plants and animals useful in a technical point of view, together with such parts of the same as occur in commerce and industry. 9. Languages. And 10. Book-keeping and commercial knowledge.

The range of the several subjects varies somewhat at different schools, according to the requirements of industry in the locality in which the school is established. The system of instruction is, in the main, the same as that employed at the Sunday and evening schools.

At the Industrial School in Stockholm instruction is given—1. In mathematics to the same extent as at the elementary technical schools. 2. In linear drawing, comprehending projective, perspective, and shading. 3. In free-hand sketching, including linear drawing, the drawing of spherical objects, ornaments, figures, and designs. 4. In mechanical engineering, with constructive drawing. 5. In general architecture and ship-building, with constructive drawing. 6. In engraving on stone, copper, and wood. 7. In modelling in clay and wax. 8. In painting in water colour, lime water colours, and oil, and also on china. 9. In making artificial flowers. 11. In living languages. 11. In book-keeping, and in other subjects. The school endeavours, in separate divisions, to make a practical application of science to all the more important branches of industry that exist, or are rising in this country.

The School of the Industrial Society at Gothenburg also aims at about the same objects as the foregoing institution, although, in consequence of smaller resources, the course of instruction has not yet been extended to so many subjects.

The form of instruction in both schools consists in the delivery of lectures, in committing lessons to memory, and chiefly in practical exercise.

The course of instruction at the Technological Institution, and at Chalmers' Industrial School, consists of—1. Pure mathematics, comprising, principally, analytical geometry, the elements of the theory of equations, and differential and integral arithmetic. 2. Practical geometry, comprising surveying and levelling for engineering and other technical purposes. 3. Descriptive geometry, both general and applied to structures of stone or wood, and to perspective and shading. 4. Theoretical mechanics, or the theory of the equilibrium and motion of bodies, in which is also comprised the theories for the construction of arches, the pressure of loose masses of earth, and of iron and wooden structures connected with the erection of edifices. 5. Applied mechanics, comprising the knowledge of machinery intended to gather and communicate natural motive power, or otherwise adapted for general application. 6. Mechanical technology, comprising a knowledge of the arts of producing those manufactures, the production of which solely or chiefly depends on mechanical appliances; and also including an acquaintance with the raw materials employed, and of the qualities of the manufactures produced. 7. General physics. 8. Applied physics, with reference more especially to the technical application of heat, light, electricity, and magnetism. 9. General chemistry. 10. Chemical technology, comprehending a knowledge of the manner in which those manufactures are produced which are chiefly dependent on chemical agency; and also an acquaintance with the raw materials employed, and the qualities of the manufactures when completed. 11. Mineralogy and geognosy, so far as these sciences possess a practical application. 12. General architecture, and the construction of houses. 13. Civil engineering. 14 Drawing, viz., linear and free-hand drawing, and touching with Indian ink. 15. Modelling ornaments, bas-reliefs, and free-standing figures in wax, clay, and gypsum. (This last is only taught at Chalmers' Industrial School.) In addition to the above, instruction is given, in the workshops of the schools in the use of the tools and the simpler machines employed in working metals and wood.

The form of instruction consists of—*a.* Lectures delivered by the teachers, in which the subject, when requisite, is elucidated by the exhibition of models, drawings, samples, and experiments. *b.* Repetitions by means of questions addressed to the pupils, and by the solution of problems given to them to perform. *c.* The execution of drawings (with descriptions, of machines, apparatus, edifices, and other objects, on which instruction is given, and also of plans of industrial establishments, all under the guidance and superintendence of those teachers whose subjects of instruction comprise the works or establishments delineated. And *d.* Practical exercise, under the superintendence and guidance of the respective masters, in surveying and levelling, in practical mechanics, general chemistry, chemical technology, the art of drawing, and the working of metals and wood.

The subjects of instruction in the Mining School at Fahlun are chiefly analytical chemistry, mineralogy, surveying of mines, the art of smelting, practical geometry and metallurgy, mechanics (more especially the theory of machines used in mining), geology, mining, comprising the study of the manner in which useful minerals occur, and of their discovery; and of the opening and measurement of mines; besides which the pupils spend a certain time, under the superintendence of the teacher, in practical operations at iron-works and mines, and also in travelling to different parts of the country, in order to inspect such works, plans being drawn of the mines surveyed during these journeys.

When the Mining School, as before mentioned, is amalgamated with the Technological Institution, there will be added to the three divisions now existing at the institution (viz., the division for the art of constructing machines and for mechanical technology; the division for chemical technology; and the division for civil engineering) a fourth division for mining science, with three sub-divisions, viz., one for mining mechanics, one for the science of foundry, and one for mining engineering.

At the Elementary Mining School at Filipstad instruction is given in theoretical and practical geometry, in plane trigonometry, physics, mechanics, linear drawing, levelling, chemistry, geology, mineralogy, and the metallurgy of iron; besides which the students obtain, at mines, foundries, or iron-works, a practical knowledge of the subjects belonging to the working of iron.

The subjects of instruction at the Ship-building Institution are:— *a.* Mathematics, comprising planometry, stereometry, algebra, plane trigonometry, the theory of conic lines, mechanics, hydro-mechanics, descriptive geometry, differential and integral calculations. *b.* The drawing of ships, and the construction of mercantile vessels. *c.* Theoretical and practical ship-building, mast-building, the study of the materials employed in ship-building. *d.* The guaging of ships. *e.* The art of constructing steam-engines. *f.* Linear drawing. *g.* Free-hand drawing. *h.* The English language. And *i.* Practical work at ship-building, each pupil being obliged to work at least 100 days annually in the ship-yards, for which he receives daily pay.

IX. There are no special privileges attached to having passed through the above-named schools, unless as such be considered the negative right, enjoyed only by the pupils of the mining school, of being clerks and stipendaries at the Iron Office. For the exercise of a technical trade, or any industrial pursuit, the laws of industry, generally speaking, do not demand more than the possession of a good character, and that a man be of age, and the uncontrolled master of his property. With respect to the manufacture of such articles as demand chemical treatment, or in connection with which wrong treatment is liable to cause fire, or endanger life or health, these manufactures, it is true, can only, according to law, be conducted by those who either themselves possess indisputably certified ability to conduct such establishments, or who have engaged for the purpose other persons whose knowledge of the manufactures in question, has been attested; but no prescription exists that such ability shall have been acquired at a technical school.

X. The teachers of the above-mentioned schools are appointed by the directors of the respective schools, with the following exceptions:—

The superintendent, who, at the same time, is the head master of the sunday and evening technical school at Eskilstuna, is appointed by the Board of Commerce.

The superintendents of the elementary technical schools, the professors of the Technological Institution, the superintendents of Chalmers' Industrial School, and of the Ship-building Institution; and also the superintendent and second master of the Mining School at Fahlun, are appointed by His Majesty.

The superintendents of the Technological Institution, and of the Industrial School in Stockholm, who are not absolutely obliged to give instruction, are also appointed by His Majesty; and

The superintendent, who at the same time is the head master, of the Elementary Mining School at Filipstad, is appointed by the Delegates to the Iron Office.

The qualifications required of the teachers are that they should possess, each in his own department, a thorough knowledge of his subject, and the ability to teach it. These qualifications are proved by certificates produced, and by their having given proof in public at the schools of their skill in teaching. Generally, the teachers have studied at the University, or at one of the higher technological institutions, and subsequently obtained more practical experience.

XI. Artistic taste, and skill in the production of works of industry, have undoubtedly been promoted by these schools.

XII. The constantly increasing number of candidates for admission to the schools, joined to the fact that manufacturers at every diet are labouring for the establishment of new and enlarged technical schools, seems to prove sufficiently that the advantage of such schools is generally understood and appreciated.

Inclosure 4 in No. 4.

Answers to "Information sought relative to Technical or Industrial Education," &c., so far as relates to the Industrial School at Carl Johan's Værn.

NORWAY.

I. and II. There is a school at Carl Johan's Værn especially intended for mechanical engineers. It is annexed to the naval engineering workshops. The school only imparts theoretical instruction, but pupils who have passed through a course of study there, may obtain practical experience in the workshops.

III. The school is chiefly attended by young persons, intending to become mechanical engineers; but persons of mature age, already workmen, are also admitted.

IV. The school is supported by the State.

V. The average number of pupils has hitherto been from 20 to 25; but applications for admission have increased during the last two years, so that an enlargement of the institution is contemplated.

VI. The pupils enjoy free instruction. The outlay of a pupil for school materials generally amounts to 10 or 15 specie dollars.* Board and lodging, which is not supplied by the school, is generally provided by the parents.

VII. The qualifications for admission to the school are the ability to read and write, and a knowledge of the elements of arithmetic, as far as the rule of three. The term of instruction in the school is from one to two years. The practical education given in the workshops extends over four or five years.

VIII. The course of instruction consists of mathematics, generally only the elements; but to specially talented pupils, a wider range is given. Theoretical mechanics, a little physics, and inorganic chemistry, English, and drawing. The instruction is mostly imparted by the pupils (under the superintendence of the teachers), executing various calculations and easy constructions, and partly by means of lectures. To the latter the men employed in the workshops, who are not pupils, have access, although this privilege is seldom embraced.

IX. Connexion with the school does not afford any further privilege than the advantage of continued instruction in the workshops. Engineers in the Royal Navy must have passed through the school, in order to rise to the higher grades of the service.

* 1 Norwegian specie dollar = 4 Swedish riksdaler.

X. The teachers are appointed by the Maritime Board. Hitherto only such teachers have been appointed whose qualifications have been previously ascertained by the Maritime Board.

XI. Pupils who have passed through the school and the workshops are sought for by persons engaged in industrial pursuits, as designers, engineers, foremen of saw-mills, and for similar purposes. They are preferred, because the instruction they have enjoyed enables them, better than those who are uneducated, to fill such posts; but as the school has only existed eleven years, no enlarged opinion respecting it can as yet be said to prevail among the manufacturers.

On behalf of the Directors of the School,

(Signed) GEELMUYDEN.

Carl Johans Værn, September 1867.

No. 5.

Mr. Burnley to Lord Stanley.—(Received November 4.)

My Lord, *The Hague, October* 31, 1867.

I HAVE the honour to inclose such information as I have been able to procure, drawn up as a report, on the subject of technical and industrial education in Holland.

I have, &c.

(Signed) J. HUME BURNLEY.

Inclosure 1 in No. 5.

Report on Technical and Industrial Education in Holland.

LORD STANLEY'S circular despatch of the 17th July directed Secretaries of Legation to report on technical and industrial education in the various countries in which they reside. I have accordingly the honour to submit the information which I have been able to gather from written and oral sources, as well as from personal inspection at Delft and at Utrecht.

In speaking of education, however, it is well to take into consideration the general character of the inhabitants themselves, and their aptitude in learning.

The most striking features of a country itself are always more or less strongly reflected in the exterior and general characteristics of its inhabitants.

The lower classes of the Dutch are flat-featured and splay-footed, and are slow and sluggish, like the waters creeping through their polders. Of course this can only be asserted of the peasantry and the working classes; the higher classes, like Sterne's shilling, have lost their stamp by frequent contact and intermingling with foreigners.

The working classes in Holland were said to be about the worst educated in all western Europe. The reasons for such being the case are various.

Until within the last quarter of a century their character was essentially agricultural, and *not* industrial or manufacturing.

Cattle-breeding, fisheries, and the hydraulic works the state of the country required, were the chief sources of employment for large numbers of hands not engaged in strictly agricultural pursuits. Neither great intelligence, nor any degree of education were requisite, and children as well as adults found ready employment. This was the case with the weavers in the eastern provinces, and with those who worked in the comparatively few existing manufactories.

Naturally slow in adopting innovations of any kind, all improvements in machinery and industrial processes were always regarded with aversion by the Dutch, and much later introduced here than elsewhere—generally, too, by foreigners.

All the gas works, for instance, in this country were at one time (and still are, for the greater part) in the hands of English companies who not only brought over their own engineers, but likewise all overlookers and fitters.

The Dutch were only employed for the rougher work.

The first railroads, too, were laid by English engineers, who brought over numerous gangs of navvies.

Jealousy of the Belgians, after 1839, raised in some degree a spirit of emulation. Iron works, sugar mills, carpet weaving, hat making, &c., began to take some development. A great deal of capital that had been invested in foreign funds was (after 1849), brought into circulation by manufacturing and industrial companies. There was a complete dearth of intelligent workmen. Their want was chiefly supplied by Germans.

A very great number of the largest commercial houses in Holland were founded by foreigners; for instance, Hope, Zesinger, Borski, at Amsterdam, and numerous English or German firms at Rotterdam.

By their connexions they were enabled to obtain foreign clerks and workmen, and this was carried to such an extent that it is a standing joke among the Dutch themselves to say that the only inhabitants of Amsterdam are Jews and Germans, and of Rotterdam Jews and English.

The German workmen, who came over in large numbers, were found to be sober, intelligent, steady, and patient; they felt themselves comparatively free and happy in Holland, and were satisfied with a very low rate of wages.

The Dutch workmen were ill-fed, weak in constitution, great gin-drinkers, utterly ignorant, and wonderfully awkward in handling all tools they had not been used to from childhood. Comparatively very few of them could either read or write. Scarcely any had any schooling after the 12th year, and many had left school (and still do so) at a much earlier age.

The manufacturers themselves evinced very little interest in the matter. Government did not interfere, for two reasons, neither of which could be avowed.

In the first place, all interventions on the part of the Government in matters with which private interests are involved, was (and is I am informed still) looked on with the greatest jealousy by *all* classes in Holland. This was carried after 1815 to the greatest excess. Every attempt at improving the condition of the working-classes would have involved the necessity of some expense to the masters or to the Government.

The least diminution of their profits would have ruined many of the new industrial enterprises, and Government would have been subject to the odium of having made a direct attack on the whole class of manufacturers.

Secondly; with regard to assistance from the public funds for the education of workmen; the treasury had suffered severely in the first years of the separation from Belgium, and besides this the higher classes as well as the lower still remembered with terror and detestation the effects of their annexation to the French empire after the great French revolution.

The expulsion of the Stadholder in 1795 had, no doubt, been partially effected by the lower classes, and after the Restoration in 1813, much of the evil that had been done was attributed by the greatest sufferers, the politicians, not so much to the bad Government of William V, as to the diffusion of knowledge among the populace by the French and their adherents.

Hence the fallacy prevailed without being *publicly* avowed among the more influential classes,—that the more ignorant the people remain the easier will it be found to govern them. It was considered dangerous to give too much instruction to the mechanic, and he got none at all.

It even became the fashion in the aristocratic conservative classes to brand as revolutionary and democratic in the extreme any measures suggested for the improvement of the *plebs* by education.

This state of affairs lasted till 1848, when the catastrophe in France and other parts of Europe found an echo in Holland.

The constitution was revised and brought the liberals into power, who remained for some time at the head of affairs.

Since that date there has been slow but gradual progress in popular education, and now a great deal is being done under the new law on secondary instruction for the improvement of the working-classes.

Nevertheless, many years must still elapse before the Dutch workman will be on a par with those of other countries.

On the revisal of the Constitution, in 1848, the passing of new educational laws was required.

No religious instruction of any description was to be given at any of the public schools.

Violent opposition ensued on the part of the pietistic Protestant section (ultra orthodox party, of which M. Groen van Prinsterer is the leader), and on the side of the Catholic clergy.

In 1857, the law on primary instruction passed under the Minister of the Interior, M. van Rappard, a moderate liberal.

In 1863, the law on secondary instruction was framed, and passed the Chamber under Mr. Thorbecke.

The law on higher university instruction will probably be brought into the Chambers in their next sitting by the present Minister, Mr. Heemskerk.

J. HUME BURNLEY.

Hague, November 1, 1867.

Answers to the Questions Proposed.

I. and II. Industrial education in Holland, according to the system of the law on secondary instruction, is neither strictly technical nor professional, except in the case of the Royal Polytechnic School at Delft; to be more fully described in its proper place.

The idea was to diffuse through all classes of society (not belonging to the learned profession) general theoretical knowledge, applicable to all branches of industry. Experience has proved that men brought

up in this way soon become practical workmen, overlookers or masters, according to the opportunities afforded them.

It had been found, too, that all practical instruction acquired at schools and not in manufactories or industrial works, remained very deficient. Much time would be lost at the schools in the acquirement of strictly professional knowledge, which might be better employed in theoretical instruction of a more useful and universal character.

There are for these reasons no *separate* schools for the different branches of industry:—

III. The law on secondary instruction decreed the foundation of the following different sorts of schools:—

(The Dutch denominations for the different schools have been rendered as literally as possible, in order to prevent their being mistaken for institutions not existing in Holland; for instance, "*Middle Class Schools*" are very different from "*Burgher Schools.*")

a. Burgher day or evening schools intended for the working classes.* Generally evening schools, the lower classes being always inclined to apprentice their children to some trade by which they may earn a trifle as soon as they leave the primary schools, where the instruction is strictly elementary. Before the new law passed, there were only schools for drawing, designing, and modelling—much liked and frequented by the inferior classes. Advantage was taken of this circumstance to combine the evening schools with these establishments and thus to promote the desire of obtaining theoretical and general instruction.

b. Higher burgher schools with three or five classes.† For the education of masters, overlookers, the commercial classes, and all those who are not intended for the army, the navy, or one of the learned professions; thus for the great mass of the population of *all ranks.*

c. Agricultural schools. Art. 19 of the law on secondary instruction provides for the foundation of *one agricultural Government school,* in case its establishment should appear desirable. Private agricultural schools may be subsidized by Government. There is but one school of this description at Groningen, and it is not favourably reported on.

d. The Royal Polytechnic School, at Delft, is intended for the scientific instruction of those industrial classes who require, according to the terms of Art. 39 of the law, "a higher degree of technical and theoretical knowledge than is obtainable at the higher burgher schools, and for the education of civil engineers (from whom the Government civil engineers are selected after competitive examination), architects, naval engineers, shipbuilders, mechanicians, and engineers for the mines."

IV. The schools are either supported:

(1.) Entirely by the towns;

(2.) By the towns with a subsidy from the province or the Government.

* *Art.* 14 *of the Law on Secondary Instruction*:—"Whoever the population of a town exceeds ten thousand, at least one school for secondary instruction, a day and evening school, must be established. If the town is so scattered, that a reasonable attendance at school can hardly be expected, or if the requirements of the law in this respect are supplied in any other way, the town may be exempted from the obligation of the first clause of this article by royal dispensation. If it appears that only an evening school is wanted, then, by His Majesty's permission, the day school may be dispensed with for a specified number of years. In this case the course of study at the evening school is fixed for two years, and the royal authority decides, with the advice of the municipal council, what subjects shall be taught.

† Art. 15, 1st clause.

(3.) Government schools;* the town merely contributing part of the whole of the sum required for the school buildings. These are all *public* schools.

(4.) Private schools; existing on their own resources; they may be subsidized like the other public schools, with a proviso (Art. 2) that no religious instruction be given.

The subsidies granted to public schools by Government amount to about £420 a-year, for the higher burgher schools with three classes; £570 a-year for higher burgher schools with five classes; Maastricht is the only school that receives about £850 per annum.

Burgher day and evening schools are not subsidized.

V. The latest official returns as to number of pupils at the higher burgher schools are dated April, 1866. There were then 1,940, showing an increase of nearly 500 in the course of one year. In 1865, there were 1,466 pupils. Now there are probably upwards of 2,200 pupils. There are no official returns concerning the number of scholars at the burgher day or evening schools.

VI. The maximum amount of school fees† is, for

The burgher day and evening school £1 per annum.

The Government higher burgher schools £5.

The fees for the other public schools are not subject to any limit by law, but must be submitted for approval to the Government.

They never exceed £10, and range, on an average, between £2 10*s.* and £5.

Books, &c., are at the students' expense. There are neither exhibitions nor free places tenable at the schools. No expenses incurred by the students are defrayed by private manufacturers. The expenses to the students at the Polytechnic School are fees to the amount of £16 per annum, and their books and instruments.

VII. No special qualification is required for admission. Boys enter the school at the age of 12 or 13. There is as yet but *one* girls' school, viz., at Haarlem.

The time spent at the day and evening schools is two years; at the higher burgher schools (3 classes) three years; at the higher burgher schools (5 classes) five years; at the Polytechnic School four years.

Students enter the Polytechnic School leaving the Higher Burgher School, or, after passing the final examination with the pupils of the higher burgher schools, at 18 or 19 years of age.

VIII. The amount of education required for admission to all the schools (except the Polytechnic School) is merely elementary, such as is acquired at the primary schools.

The subjects of instruction at the public schools are regulated by law, as follows:—

Burgher day or evening schools.

Art. 13.

a. Mathematics.

b. The first rudiments of theoretical and practical mechanics, and of the knowledge of machinery.

c. Of natural philosophy (physics) and chemistry.

d. Of natural history.

e. Of technology, or of agricultural science.

* Art. 18:—Fifteen Government schools at least are to be founded in different parts of the kingdom; of which not less than five to be schools with a five years' course of study.

† Art. 37.

f. The rudiments of geography.
g. The rudiments of history.
h. The rudiments of the Dutch languag..
i. The first principles of political economy.
k. Ordinary and rectilinear drawing.
l. Gymnastics.

It rests with the local authority to determine whether the rudiments of technology or of agriculture, or of both, shall be taught. Instructio.. in modelling or in some foreign language, French, English, or German, may be added. The same authority determines which of these subjects shall be taught in the evening schools.

Higher burgher schools (3 classes).

Art. 16.

a. Mathematics.
b. The first rudiments of natural philosophy, physics, and chemistry.
c. The rudiments of botany and zoology.
d. The rudiments of political economy.
e. The rudiments of book-keeping.
f. Geography.
g. History.
h. The Dutch language.
i. The French language.
k. The English language.
l. The German language.
m. Caligraphy.
n. Ordinary and rectilinear drawing.
o. Gymnastics.

Higher burgher schools (5 classes).

Art. 17.

a. Mathematics.
b. The rudiments of theoretical and practical mechanics, of the knowledge of machinery and technology.
c. Natural philosophy (physics) and its principal applications.
d. Chemistry and its principal applications.
e. The principles of mineralogy, geology, botany, and zoology.
f. Principles of cosmography.
g. The principles of the municipal, provincial, and central government of the Netherlands.
h. Political economy and statistics, especially of the Netherlands and its colonies.
i. Geography.
k. History.
l. Dutch language and literature.
m. French language and literature.
n. English language and literature.
o. German language and literature.
p. The rudiments of commerce, knowledge of raw and wrought materials and book-keeping.
q. Caligraphy.
r. Ordinary and rectilinear drawing.
s. Gymnastics.

Agricultural Schools.

Art. 20.

a. Political economy.

b. Practical mathematics, such as surveying, levelling, and measuration.

c. Mechanical science, as applied to agriculture, and instruction in agricultural machines.

d. The construction and arrangement of farm buildings.

e. Rectilinear drawing as applicable to agricultural science and machinery.

f. Natural science (physics), chemistry, and meteorology in their application to agriculture.

g. Agricultural technology.

h. Mineralogy and geology in their application to agriculture.

i. General and special botany and zoology.

k. The anatomy and physiology of plants and animals.

l. The distinguishing characteristics of the various races, diseases, and medicinal treatment of domestic animals.

m. General and special agriculture, arable land, meadow land, vegetable and fruit gardening, and rearing of timber and fruit teees.

n. Rearing of cattle, including domestic poultry, bees and dairy produce.

o. Farm book-keeping.

p. Practical farming, including cultivation of woods and forests, and treatment of domestic animals.

q. Farming in the colonies.

The 21st Art. of the law provides that in all description of schools, whether founded by public bodies or private persons, with or without subsidies, the course of instruction may be modified according to circumstances, and either curtailed or extended. The establishing of a middle school for girls by public bodies or private persons, with or without subsidies, is permitted according to the conditions annexed to such subsidies.

Instruction is given by special masters in the different branches. The lessons are theoretical, except, of course, in drawing or modelling and moulding, and in experimental chemistry. They are not accompanied by participation in actual manufactory processes or works. On the payment of certain quarterly very moderate fees, "auditors" are admitted to any course of lectures they may please to follow. They are not considered in the light of regular students.

The teachers at the higher burgher schools are recommended to accompany the students of the higher classes on visits to neighbouring manufactories, iron-works, sugar mills, &c.

The actual division of time and study may be seen from the syllabus of instruction for a burgher day and evening school, for a higher burgher school (three classes), and for a higher burgher school (five classes).*

The subjects of instruction at the Polytechnic School are Art. 40.

a. The higher parts of algebra.

b. Spherical trigonometry and analytical geometry.

c. Descriptive geometry and its applications.

d. Differential and integral culculus.

e. Surveying, levelling, and surface measurements.

* Vide Appendix B, p. 66.

f. Theoretical mechanics.
g. Applied mechanics.
h. Machinery.
i. Mechanical technology and agricultural machines.
k. Applications of natural science.
l. Applied, practical, and analytical chemistry.
m. Chemical technology.
n. Modern manufactures.
o. Mineralogy and geology.
p. Applied geology and working of mines.
q. Metallurgy.
r. Hydraulics, road, railroad, and bridge-building.
s. Civil architecture.
t. Ship-building.
u. Rectilinear drawing, in application to the different branches of science.
v. Practical instruction in the use of tools, instruments, and the turning lathe.
w. Construction of models.
x. Political economy.
y. Commercial law.
z. Laws relating to engineering, public works, mining, and all industrial works.

IX. The diploma granted to students who have passed the final examination at the higher burgher schools* (five classes) exempts from—

First examination at the polytechnic schools.

First examination East Indian Civil Service, and from some part of the examination as sworn and examined land surveyor.

No other privileges are acquired by frequenting these schools. No special education is required for the exercise of any trade or profession (except the learned ones).

At the Polytechnic School diplomas are granted in technology†, and further as

Civil engineer,‡
Architect,§
Naval engineer,‖
Mechanician,¶
Engineer for the mines.**

Vide Appendix C for the different branches, in which the candidates must pass before obtaining a diploma.††

X. The law contains the following stipulations for the appointment of teachers.‡‡

* Art. 56. The final examination is conducted by a commission, composed of a president, the director of the school, and teachers of the several subjects of the examination, gymnastics are excepted. If agriculture and technology are both taught, the pupils have the choice in which they will be examined.
The examinations are public.
† Art. 60, vide Appendix C, p. 69.
‡ Art. 61, vide Appendix C.
§ Art. 62, vide Appendix C.
‖ Art. 63, vide Appendix C.
¶ Art. 64, vide Appendix C.
** Art. 65, vide Appendix C.
†† Art. 58. The final examinations of the Polytechnic School are conducted by commissioners appointed by the Minister of the Interior.
‡‡ What follows refers to all the schools except the Polytechnic School.

At the head of the school one of the masters is placed with the title of director.*

The number of masters at the town schools, and their salaries, are fixed by the Municipal Council.† All measures in reference to the above are submitted for approval to the Provincial Government. If the schools are subsidied by the province or the Government, the approval of the Minister of the Interior is required. The Municipal Council appoints the director‡ and masters from a list of candidates (in most cases three names for each place) sent in by the Burgomaster and the "Echevins," in Dutch "Wet houders"—the French échevin is the best equivalent; in some respects the office corresponds with that of alderman, on recommendation of the inspector. The directors and masters of Government schools are appointed by the Crown.

The directors and masters of schools are entitled to a pension§ after 40 years' service, and at 65 years of age, and earlier if incapacitated for service by illness or accident.

The rate of pension is fixed at one-sixtieth of the amount of salary (employed during the last five years of service) for every year's service.

The maximum pension is two-thirds of the full pay.

Directors and masters contribute to the pension fund:—

1. One year's salary, to be paid in the course of the first five years.

2 The full amount, for one year, of every augmentation of pay to be liquidated in four years' time.

3. An annual contribution of 2 per cent., which is regularly deducted from their pay.

The qualifications required are the following:—

For the Burgher Day and Evening Schools.||

1. A testimonial as to character and conduct from the municipal authorities.

2. A diploma, obtainable on passing examination.¶

3. Diplomas qualifying for instruction in each separate branch specified under it—the agricultural sciences, in modern languages and literature, geography and history, political economy, commercial sciences, navigation, drawing and designing and modelling. Caligraphy and gymnastics are likewise granted.

4. The diploma of the "head master," and other diplomas granted by the law on primary instruction, qualifies for instruction too at the burgher day and evening schools.

For the higher Burgher Schools (three classes).

**1. The above-mentioned testimonial.

* Art. 23.
† Art. 24.
‡ Art. 29.
§ Art. 31.
|| Art 25.

¶ Art. 70. Schoolmasters can obtain two sorts of certificates in natural and mechanical science. For the first certificate A the candidate has to pass an examination in:—

(*a.*) Arithmetic, algebra, geometry, plane and spherical trigonometry, rudiments of descriptive and analytical geometry.

(*b.*) Rudiments of theoretical and practical mechanics, machinery and technology.

(*c.*) Principles of natural science, chemistry, and cosmography.

(*d.*) The rudiments of mineralogy, geology, botany, and zoology.

The second certificate, B, which can be obtained only by those who can produce certificate A, requires the candidate to pass an examination in:—

(*e.*) Descriptive and analytical geometry, differential and integral calculus.

(*f.*) Theoretical and practical mechanics.

** Art. 26.

2. The diploma, as above, A, and separate diplomas for the other branches of instruction at those schools.

For the higher Burgher Schools (five classes).*

1. Testimonial as above.

2. The certificate granted after passing the examination, B, and the diplomas under Arts. 71, 72, 73, 74, 75,† in the branches in which the masters are to give instruction.

A Government Commission is appointed every year for the examination of candidates for diplomas.

The Commission is subdivided into—

a. A board of examiners for the exact sciences.

b. Idem for literary branches. No diploma is granted without a *pedagogical* examination, except for "private instruction," (*i.e.*, tutors, &c., who are not qualified for schools).

The examinations are presided over by two inspectors. Members

* Art. 27.

† Art. 71. Schoolmasters can obtain two sorts of certificates in natural sciences.

The first certificate A is the same as certificate in Art. 70.

The second certificate, B, which can be obtained only by those who can produce certificate A, requires the candidate to pass an examination in :—

(*a.*) Analytical geometry.
(*b.*) Differential and integral calcalus.
(*c.*) Theoretical mechanics.
(*d.*) Natural science and its principal applications.
(*e.*) Meteorology.
(*f.*) Chemistry.

Art. 72. Schoolmasters can obtain two sorts of certificates in chemistry.

The first certificate, A, is the same as certificate A in Art. 70.

The second certificate, B, which can be obtained only by those, who can produce certificate A, requires the candidate to pass an examination in :

(*a.*) General, applied, and analytical chemistry.
(*b.*) Chemical technology.
(*c*). Natural science.

Art. 73. Schoolmasters can obtain two sorts of certificates in agriculture.

The first certificate, A, which can be obtained by those who can produce certificate A in Art. 70, requires the candidate to pass an examination in the rudiments of agriculture.

The second certificate B, can be obtained by passing the examination required for the diploma of agriculture.

Art. 74. Schoolmasters can obtain certificates in Dutch language and literature and science of history, after passing an examination in :—

(*a.*) The Dutch language and literature.
(*b.*) History.
(*c.*) Mathematical, natural, and political science.

Certificates are given in political economy, after candidates have passed an examination in :—

(*a.*) Political economy and statistics, especially of the Netherlands and its colonies.
(*b.*) The principles of the municipal, provincial, and central administrations.

Art. 75. Schoolmasters can obtain certificates in commercial science, after passing an examination in :—

(*a.*) Book-keeping.
(*b.*) The principles of commercial science, embracing commercial law, commercial geography, statistics of industry and commerce, financial systems, and articles of commerce.

Schoolmasters can obtain certificates for instruction in navigation, after passing an examination in :—

(*a.*) Elementary mathematics, spherical trigonometry, comprising—
(*b.*) The rudiments of astronomy.
(*c.*) The phenomena of the atmosphere and the ocean.
(*d.*) Instruments used in taking observations at sea.

are selected from among the University Professors, and other learned bodies.

The examinations are public.* Those who have taken a degree at one of the Dutch Universities are qualified for instruction, without examination in the branches for which they have taken honours in the University. Those who have not had the advantage of an university education are entirely dependent on their own resources for obtaining the knowledge requisite for passing the examination. The consequence is that the result of the examinations has hitherto been far from satisfactory. Scarcely one-third of the candidates passed. It is expected that the law on higher instruction will remedy this evil.

11. The foundation of all these schools is of too recent date to admit of any conclusion in this respect. It must be remembered, too, that they are intended for the diffusion of general knowledge, without reference to any particular profession or trade.

12. The public were at first indifferent, but now certainly very favourably inclined.

Government Control.

Articles 46 and 47 of the law on primary instruction place all schools, either public or private, under the control of the Minister of the Interior.

Inspectors are appointed by the Crown, who are in direct correspondence with the Minister. Local boards of superintendence are appointed by the municipal authorities.†

APPENDIX A.

Annual Costs of a Higher Burgher School (3 Classes).

1 director	£200
4 teachers, at £150	600
1 „ for political economy (generally a lawyer)	50
1 „ „ gymnastics	50
1 „ „ drawing-master	70
1 porter	40
Library, instruments, firing, lighting, &c.	180
	£1190

* Vide Appendix D, report of examinations, &c. (p. 71.)

† Art. 50. Inspectors and members of local boards of superintendence are enjoined to report all infringements on the laws on secondary instruction.

Art. 51. Schools are at all times open to inspectors and superintendents. Refusal on the part of schoolmasters to give required information is punishable by law.

Art. 52. Local superintendents must visit the schools twice in the year at least. Their duty is to see that all the rules are observed, to register the number of masters, pupils, and the state of instruction, and give the inspector all the information that he requires. Every year before the first of May they report to the municipal council concerning the state of the school, and transmit copies to the inspector.

Art. 53. The inspectors must keep up their knowledge of the condition of the schools by visits of inspection, and by communicating with the board of superintendence and the masters; they must make all reports required by the Minister of the Interior, and bring before him all that is necessary concerning secondary instruction.

Every year before the first of May, they send in their report to the Minister of the Interior.

Art. 54. In like manner the Inspector of Agricultural Education is empowered and required to fulfil his duties and make his reports.

Higher Burgher School (5 *Classes*).

1 director	£250
5 teachers, at £200	1,000
4 „ „ £150	600
1 drawing-master	100
1 gymnastics..	50
1 amanuensis..	50
1 porter	40
Library, &c., as above	300
	£2,390

(Average sums, varying according to local circumstances.)

To these sums must be added the interest of the capital invested in the buildings, and the necessary repairs.

The expenses of the evening schools are comparatively small. The same teachers are employed as at the higher burgher schools, with a trifling addition from £30 to £40 a year to their salaries.

The annual sum expended on secondary instruction by Government is now about £35,000, and is on the increase.

Appendix B.

Weekly Course of Instruction at a Burgher Evening School.

		6–7 o'clock.	7–8 o'clock.	8–9 o'clock.
Monday ..	1st Class	Dutch.	Arithmetic.	Algebra.
	2nd „	Technology.	Geography.	Dutch.
	3rd „	Physics.	Mechanics.	Mechanics.
Tuesday ..	1st „	Arithmetic.	Geometry.	History.
	2nd „	Drawing.	History.	Geometry.
	3rd „	Drawing.	Botany and Zoology.	Chemistry.
Wednesday	1st „	Drawing.	Arithmetic.	Arithmetic.
	2nd „	Rectilinear drawing.	Botany and Zoology.	Chemistry.
	3rd „	Rectilinear drawing.	Geometry.	Political economy.
Thursday .	1st „	Drawing.	Gymnastics.	
	2nd „	Rectilinear drawing.		Gymnastics.
	3rd „	Rectilinear drawing.		Gymnastics.
Friday ..	1st „	Rectilinear drawing.	Rectilinear drawing.	Dutch.
	2nd „	Drawing.	Mechanics.	Mechanics.
	3rd „	Drawing.	Technology.	Geometry.
Saturday ..	1st „	Drawing.	Algebra.	Geography.
	2nd „	Rectilinear drawing.	Rectilinear drawing.	Algebra.
	3rd „	Algebra.	Rectilinear drawing.	Rectilinear drawing.

For further particulars, the printed papers marked Appendix B, are referred to.

Appendix B. Weekly Course of Study at a Higher Burgher School (Three Classes).

Days.	Hours.	1st Class.	2nd Class.	3rd Class.	Observations.
Monday	8– 9	French.	German.	History.	From the 1st of November to the 1st of March the lessons from 8–12 are given from 9–1. For further particulars, vide printed papers marked APPENDIX B.
	9–10	German.	History.	French.	
	10–11	Arithmetic.	French.	Rectilinear drawing.	
	11–12	Rectilinear drawing.	Arithmetic.	English.	
	2–3	Algebra.	Dutch.	Political economy.	
	3–4	History.	Geometry.	German.	
Tuesday	8–9	French.	Algebra.	Arithmetic.	
	9–10	Dutch.	English.	Geometry.	
	10–11	Calligraphy.	Rectilinear drawing.	Physics.	
	11–12	History.	Geography.	French.	
	2–3	Arithmetic.	Bookkeeping.	Dutch.	
	3–4	English.	Natural history.	Bookkeeping.	
Wednesday....	8–9	French.	History.	Algebra.	
	9–10	Algebra.	Arithmetic.	History.	
	10–11	English.	Geometry.	Geography.	
	11–12	Gymnastics.	German.	German.	
	2–3		Gymnastics.		
	3–4			Gymnastics.	
Thursday.....	8–9	Arithmetic.	Geography.	Geometry.	
	9–10	Dutch.	Physics.	Political economy.	
	10–11	Geography.	History.	Physics.	
	11–12	French.	Dutch.	Arithmetic.	
	2–3	History.	Chemistry.	English.	
	3–4	English.	French.	Natural history.	
Friday.....	8–9	French.	Algebra.	History.	
	9–10	German.	History.	Algebra.	
	10–11	Arithmetic.	Rectilinear drawing.	Drawing.	
	11–12	Rectilinear drawing.	English.	Geography.	
	2–3	Geography.	French.	Chemistry.	
	3–4	Algebra.	Mathematics; geography.	Dutch.	
Saturday.....	8–9	German.	Geometry.	French.	
	9–10	Dutch.	Dutch.	Geometry.	
	10–11	Algebra.	Physics.	Drawing.	
	11–12	Gymnastics.	Drawing.	Mathematics, geography.	
	2–3			Gymnastics.	
	3–4		Gymnastics.		

Appendix B. Weekly Course of Study at a Higher Burgher School (Five Classes).

Days.	Hours.	1st Class.	2nd Class.	3rd Class.	4th Class.	5th Class.	Observations.
Monday	9–10	Dutch.	English.	Mathematics.	French.	Mathematics.	Gymnastics and the rudiments of the manual drill are taught Wednesday and Saturday afternoons. There are about eight weeks holidays in the year; six in the summer, one at Christmas, and one at Easter. For further particulars, vide printed papers marked Appendix B.
	10–11	Mathematics.	German.	Chemistry.	Mathematics.	Dutch.	
	11–12	Geography.	Mathematics.	German.	Rectilinear drawing.	Geology.	
	1–2	German.	} Drawing.	Dutch.	Chemistry.	Political economy.	
	2–3	Natural history.		History.	Mechanics.	English.	
	3–4	French.	Geography.	Rectilinear drawing.	Political economy.	Physics.	
Tuesday	9–10	French.	Mathematics.	Geography.	Cosmography.	Mechanics.	
	10–11	Mathematics.	Dutch.	Mathematics.	Chemistry.	History.	
	11–12	German.	Mathematics.	Physics.	History.	Rectilinear drawing.	
	1–2	Dutch.	English.	History.	German.	Technology.	
	2–3	History.	German.	English.	Physics.	Chemistry.	
	3–4	Rectilinear drawing.	Natural history.	French.	English.	Political economy.	
Wednesday	9–10	History.	Geography.	Mathematics.	Mineralogy.	Mathematics.	
	10–11	Mathematics.	French.	German.	Mathematics.	History.	
	11–12	Natural history.	Mathematics.	History.	History.	German.	
	12–1	Calligraphy.	History.	French.	Geography.	Drawing.	
Thursday	9–10	Dutch.	Rectilinear drawing.	Chemistry.	Mathematics.	Physics.	
	10–11	Mathematics.	French.	Rectilinear drawing.	Geography.	History.	
	11–12	French.	English.	} Mathematics.	Physics.	Cosmography.	
	1–2	History.	German.		English.	Technology.	
	2–3	German.	Dutch.	} Drawing.	Mechanics.	Commercial science.	
	3–4	Geography.	Mathematics.		Political economy.	French.	
Friday	9–10	Mathematics.	English.	Dutch.	Physics.	Rectilinear drawing.	
	10–11	Rectilinear drawing.	Dutch.	Physics.	Dutch.	German.	
	11–12	History.	Mathematics.	German.	History.	Physics.	
	1–2	Geography.	French.	English.	German.	Commercial science.	
	2–3	} Drawing.	History.	French.	Chemistry.	Geography.	
	3–4		Natural history.	History.	French.	English.	
Saturday	9–10	Dutch.	History.	Mathematics.	Mathematics.	Mechanics.	
	10–11	Mathematics.	French.	Geography.	Rectilinear drawing.	Chemistry.	
	11–12	French.	Rectilinear drawing.	History.	} Drawing.	Mathematics.	
	12–1	German.	German.	English.		French.	

Appendix C.

Art. 60. Candidates for the diploma in technology are required to pass an examination, besides the final one of the higher burgher schools, in :—

a. Spherical trigonometry, and the rudiments of analytical geometry.

b. The rudiments of descriptive geometry.

c. The rudiments of theoretical and applied mechanics, and knowledge of machinery.

d. Rudiments of mechanical technology.

e. Application of natural science.

f. Applied and analytical chemistry.

g. Chemical technology.

h. Architecture, as far as belongs to the knowledge of building materials and the construction of ordinary buildings.

i. Ordinary and ornamental drawing.

Art. 61. Candidates for the diploma of civil engineer are required to pass two examinations, besides the first examination A, referred to in Art. 59.

The second examination B comprises—

a. Higher algebra.

b. Spherical trigonometry and analytical geometry.

c. Descriptive geometry.

d. Differential and integral calculus.

e. Application of natural science.

f. Analytical chemistry in relation to building materials.

g. The knowledge of building materials, as well such as are employed in ordinary cases, as in hydraulic works.

h. The construction of the foundation of buildings.

i. Plain architectural and hydraulic work, drawings, and ordinary drawing.

The third examination C, comprises :—

a. Theoretical and applied mechanics and machinery.

b. Hydraulic architecture, comprising—

1. Construction of roads, railroads, bridges.
2. Construction of coast defences.
3. The knowledge of rivers as means of drainage, &c., in relation to navigation.
4. The construction of canals, sluices, harbours, and marine works.
5. The hydrography of the country, knowledge of polders and mill drainage.

c. Domestic architecture, comprising :—

1. The construction of plain buildings.
2. The principles of ornamental architecture.

d. Working plans, ornamental and ordinary drawings, as well as drawing of subjects belonging to hydraulic architecture.

e. The drawing up of plans, sketches, and estimates.

f. The rudiments of geodesy, practical surveying, and levelling.

g. Laws relating to engineering and public works.

Art. 62. Candidates for the diploma of architect, or building engineer, are required to pass through examinations, besides first examination A, referred to in Art. 59.

The second examination, B, is the same as examination B in the preceding article.

The third examination, C, comprises :—

a. The subjects under *a* and *c*, in examination C, in Art. 61.

b. Civil and ornamental architecture, in all their bearings.

c. Hydraulic architecture, as far as concerns the construction of the various roadways, bridges, sluices, and quays.

d. Theoretical and practical surveying and levelling.

e. Architectural, ornamental, and ordinary drawing.

f. Laws that relate to public works.

Art. 63. Candidates for the diploma of naval architects are required to pass two examinations, besides first examination referred to in Art. 59.

The second examination B comprises :—

a. The subjects under *a*—*e* of the examination B in Art. 61.

b. Analytical chemistry in relation to the materials for ship-building.

c. The knowledge of materials employed in ship-building.

d. The rudiments of naval and ordinary drawing.

The third examination, C, comprises :—

a. The subject *a* of examination C in Art. 61.

b. Drawing of machinery.

c. Naval architecture and designing of ships.

d. Hydraulics and hydraulic drawing, as far as relates to works connected with navigation.

Art. 64. Candidates for the diploma of mechanical engineer are required to pass two examinations, besides first examination, A, referred to in Art. 59.

The second examination, B, comprises :—

a. The subjects *a*—*e* of the examination B in Art. 61.

b. The subjects in Art. 60.

c. Analytical chemistry in relation to the materials of machines.

Examination C comprises :—

a. The subject *a* of examination C in Art. 61.

b. Mechanical technology and construction of machines.

c. The subject *h* in Art. 60.

d. Ordinary drawing and drawing of machinery.

e. Laws relating to manufactories and machinery.

Art. 65. Candidates for the diploma of mining engineer are required to pass two examinations besides first examination A referred to in Art. 59.

The second examination B comprises :—

a. The subjects *a*—*e* of examination B in Art. 61.

b. Mineralogy.

The third examination, C, comprises :—

a. The subject *a* of examination C in Art. 61.

b. The subject *h* in Art. 61.

c. The subject *d* of examination C in Art. 62.

d. Geology and its applications.

e. Working of ore.

f. Testing of ore.

g. Metallurgy.

h. Drawing of machinery.

i. Laws relating to mining.

Appendix D.

Reports of the Commissions appointed for the Examination of Masters, and for Granting Certificates qualifying them to give Secondary Instruction.

The four subjoined reports were successively sent in to the Government between 1864 and 1867.

They contain all statistics and particulars regarding the examinations.

The principal features are given here; for details the reports themselves are submitted for reference (*vide* printed papers marked Appendix D):—

a. *Examinations in mathematics, natural sciences, technology, navigation, &c.*

The examinations are partly oral, partly in writing.

The examination papers are drawn up by the members of the board for the different branches, and submitted for approval to the whole body of examiners. The work of all candidates, after correction by the examiner, is submitted to the whole board.

Opportunities are afforded during the oral examination for the correction of faults made in the written papers. In the natural sciences, chemistry, technology, and navigation, the candidates are required to show their proficiency in the use of instruments, in experimental philosophy, &c.

The examination in drawing comprises a composition on a given subject within a stated time, drawing from nature, designing, architectural, ornamental and rectilinear drawing, or modelling in clay or plaster.

In all branches the pedagogical proficiency of the candidate is strictly inquired into.

Reference to the reply to *question ten* will show the amount of knowledge required of the candidates.

b. *Examinations in the literary branches (modern languages, and literature, history, geography, political economy, &c.).*

The examinations are conducted in the same manner as those described above.

No candidates pass for modern languages who are not first-rate grammatical scholars, and well versed in literature and its history. A very correct pronunciation and great fluency in speaking, besides a good style in composition, are considered indispensable.

Knowledge of etymology, synonymes and idioms, and the ready interpretation of ancient and modern writers, and of the different methods of instruction, is required of all candidates.

Knowledge of ancient and modern history to the fullest extent is required.

The history of the Netherlands from the earliest times down to the present day, and intimate acquaintance with all standard authors who have treated this subject. The candidates are allowed to select one from four or five subjects on which to write a paper. The examination lasts one whole day for each subject.

Mathematical and physical, as well as political and historical, geography, are treated separately with the candidates.

They have been generally found very deficient in ethnographical knowledge.

Political economy embraces thorough knowledge of the principles of everything regarding this subject in Holland, and general information on the best known systems and authorities in other parts.

No. 6.

Lord Bloomfield to Lord Stanley.

My Lord, *Vienna, November 26th*, 1867.

With reference to your Lordship's despatch of the 10th August, instructing me to procure information respecting technical and industrial education in Austria, I have the honour to enclose to your Lordship herewith copy, with translation by Mr. Seymour, of a note which has been addressed to me by Baron Beust, from which I regret to learn that the Imperial Government is not as yet in a position to afford me the various information required by Her Majesty's Government.

It is to be inferred from Baron Beust's communication that the establishment and conduct of technical and industrial schools in Austria are left to the action of the several local provincial authorities, and that it will consequently require a considerable space of time in order to collect from so various and distant sources sufficient information to enable the Government to furnish adequate and authentic replies to the various queries enumerated by your Lordship.

I have, &c.

(Signed) BLOOMFIELD.

Inclosure in No. 6.

Baron Beust to Lord Bloomfield.

(Translation.)

The Ministry for Foreign Affairs did not fail to communicate without loss of time to the Imperial Ministry of Public Worship and Education as regarding the German and slave provinces, and to the Hungarian Minister as regarding the kingdom of Hungary, the series of questions concerning technical and industrial schools in Austria, which was transmitted to it by His Excellency Lord Bloomfield in his note of the 9th of August last, and to which answers are desired by the British Government.

A preliminary answer has now reached the Imperial Minister for Foreign Affairs from the Department of Public Worship and Education, stating that inquiry has to be made of the several provincial authorities, since, in this instance, the question is one of information relative to matters which belong chiefly to the provincial administrations; and, moreover, that when the said department shall have procured the various and comprehensive details asked for, their classification will, it is feared, necessitate a further delay.

The Minister for Foreign Affairs regrets that, under these circumstances, he is unable for the present, at least, to communicate to His

Excellency any result more satisfactory to the wishes of his Government, and will take care to forward to Lord Bloomfield the information in question as soon as it may reach him, and he avails himself, &c.

For the Minister for Foreign Affairs,
(Signed) MEYSENBUG.

No. 7.

Report on Technical Education in Bavaria, by Mr. Fenton, Secretary to Her Majesty's Legation.

BEFORE entering on the subject of technical education in particular as carried on in Bavaria, it may be well to draw an outline of the system of public education in general, as provided for at the various institutions established by the State or by the municipal authorities of this country.

In the first place there exists the institution of popular or national schools (volksschulen), for boys and for girls, attendance at which is obligatary on all children—from their sixth to their twelfth year inclusive—whose parents are unable or unwilling to provide them with any other or better description of education.

There are further, as forming the next step in the system of popular education, the Sunday and holiday schools (Sonn-und Feiertags-schulen) which children, after leaving the week-day national schools, are bound to attend, until they have completed their sixteenth year.

In the former order of schools the education afforded is of a simple and elementary character, consisting (besides instruction in religion), of reading, writing, German, grammar, &c., arithmetic and geography, with sewing, knitting, &c., for girls. In the Sunday and holiday schools, instruction of a somewhat superior description is given, the subjects taught comprising, in a higher degree, all those prescribed for the week-day national schools, and in addition, drawing, the elements of geometry, chemistry, practical mechanics, &c., for boys; and various descriptions of female work for girls.

The annual payment for each scholar at both descriptions of school is extremely small, varying from 24 to 36 kreutzers (8*d.* to 1*s.* sterling) per quarter, and in cases where poverty is pleaded by the parents, the children are admitted free of all charge.

According to the latest statistical returns of a comprehensive kind—namely those made up to the close of the fiscal year ended September 30th, 1863—the total number of national schools and holiday schools established in Bavaria, was 8,277, with 9,525 teachers, male and female, and the total number of children who frequented the schools during the year in question (the aggregate population of Bavaria having consisted at that period of about 4,750,000 souls,) was as follows:—

At the week day national schools:

Boys	.. ..	206,313
Girls	.. ..	304,138
Total	..	600,451

At the Sunday schools:

Boys	..	111,441
Girls	..	119,441
Total	..	230,882

On an average about one-third of the expense of maintaining these schools is contributed by the municipal or communal authorities, about one-quarter is derived from payments made in behalf of the scholars, and the remainder is made up by contributions from the State or provincial funds,* from endowments, private subscriptions, &c.

The aggregate receipts of these schools from all sources amounted, during the year 1863, to 3,872,008 florins, or about £322,650.

The other educational institutions of Bavaria are divided into two distinct branches or categories, the one destined for the purposes of general education, which is placed under the direction of the Minister for Church and School Affairs, the other branch for what is understood in Bavaria, as technical education, and which is under the supervision of the Minister of Commerce and Public Works.

Of the former it is sufficient to state that it consists of the following series of schools:

Latin schools,
Gymnasiums,
Lyceums,

organised with the object of conferring a liberal and classical education, and, by means of a higher course of study to be followed successively at each, of especially preparing young men for subsequent admission to the universities of the State. Of Latin schools there were in 1863, 84 with 507 teachers, and 6,355 scholars; of gymnasiums 28 with 354 teachers, and 2,508 scholars; of lyceums 10 with 77 teachers, and 429 scholars.

The system of public technical education in Bavaria, as organised by a Royal Decree, issued in May, 1864,† rests upon the following series of institutions:—

Trades schools,
Real gymnasiums,‡
Polytechnic schools,

and there are likewise the so-called "Fortbildungs-schulen," or "schools for further education," at which instruction is given on Sundays and holidays; but these are in most cases, in immediate connection with, and form only a separate branch of the trade schools.

Independently of the above-named institutions, all of which are essentially of a public character—that is to say, instituted by the central or by the municipal authorities—there are a few special

* Each of the eight provinces or "circles" of Bavaria has its own fund, derived from rates levied in the province itself, and from a special contribution made to it annually from the State Exchequer. This fund, which is destined for the support of provincial, as distinguished from State or Government institutions, the maintenance of roads and for other local purposes, is under the exclusive control of the Provincial Council (Landrath), a body elected by the inhabitants of the provinces.

† See Appendix, page 253.

‡ The term "real" is used in Germany in connection with education to designate that which is essentially of a positive and practical character, and of which classical studies form only an unimportant part. The technical gymnasiums are styled "real" in order to distinguish them from the other gymnasiums, the education at which is chiefly classical.

schools established in particular localities by the district authorities or by private individuals, at which some trade is taught, but they do not appear, as far as I have been able to ascertain, to be of much importance, or to have any material bearing on the education of the industrial classes in general, which may be said to rest almost exclusively upon the system of government, or municipal public schools.

Before going into any details with reference to those schools, it may be well to remark that though they constitute, as already stated, the whole system of public institutions established in Bavaria, for the purposes of what is understood in this country as technical education, they do not appear to come strictly within the circle of such special institutions as would seem to be more particularly kept in view in the series of questions on the subject of "technical or industrial education" in Bavaria, which were lately addressed to this Mission by Her Majesty's Secretary of State for Foreign Affairs, and to which this report is intended to serve as a reply. For, as will be gathered from what I shall have occasion to state, the system of education prescribed for the three above-mentioned orders of schools, known here as "technical," is not as a general rule intended to promote "any industries in particular," nor are the schools—except in the case of one or two to which a section has been added for a special purpose "directly connected with any such particular industries." On the contrary, the usual course of instruction is essentially of a *general character*, the object of the lower grade of schools being to afford a plain and generally useful education, and at the same time by means of theoretical instruction in the rudiments of certain branches of art and science, and in the application to practical purposes of the knowledge so acquired, to cultivate the understanding and taste of the scholars, and give them a greater aptitude for learning, and for subsequently exercising with intelligence any particular trade or industry. The intention of the next order of schools in the ascending scale, is to confer a higher grade of the same description of education and to qualify the scholar for a position superior to that of a tradesman or mechanic; or to enable those who aspire to a still higher class of education to prepare themselves, by means of the necessary preliminary studies, for admission to the third or uppermost grade of technical institution, the course of study at which is more particularly of a high scientific order, and such as is presumed to qualify the student for entering on the profession of a civil engineer, or on any other avocation for which special scientific training is required.

I will now proceed to give, as well as I am able, from the information which has been furnished to Her Majesty's Legation by the Bavarian Government, and from that which it has been in my power to collect from other authentic sources, such details respecting the organization of the technical schools, the instruction afforded at them, &c., as may best serve as an answer to the series of questions above referred to in so far, at least, as those questions are applicable to the state of things existing in Bavaria.

The trade schools were originally established in this country soon after the commencement of this century, under the name of agricultural and industrial schools, but they were re-organized under the provisions of the Royal Decree of the year 1864, by which the whole system of technical education was established on the footing on which it at present exists, and the name of Trades Schools was then given to them. But (as it is perhaps scarcely necessary to remark after what I have stated as to the general character of public technical education in Bavaria) they appear to have been so named rather from the fact

that they were instituted with the view of giving to the children of trades people and mechanics such an education as seemed best calculated to meet the requirements of their social position, than because it was intended that trades or handicrafts of any description should necessarily be taught at these schools; indeed, they are described in the decree above-mentioned as "public institutions created for the purpose of giving a suitable general education, and of preparing (the scholars) for entering upon a trade or profession."

These institutions are exclusively day schools, and are intended for boys only.

They are not in all cases Government schools; some of them, namely, those established in the chief or capital city of each of the eight provinces of Bavaria, as well as in some of the other large towns, are instituted by the Government authorities of the province, and are supported chiefly by the State and by contributions from the provincial funds, but they also receive, generally speaking, a yearly contribution towards their maintenance from the municipal or corporation funds. In the smaller towns the trades schools are founded as a general rule, and are principally maintained by the municipality or commune.

In the former case the schools are under the immediate control, as regards their management, the appointment of masters, teachers, &c., of the authorities of the province (Kreis-Regierung), in the latter case under that of the municipality, and the school buildings are provided, as the case may be, by the provincial or by the municipal authorities.

At the date of the decree above referred to, the total number of trades schools for the whole of Bavaria was fixed at twenty-nine, and the towns in which they are established are the following:—Munich, Freising, Ingoldstadt (province of Upper Bavaria), Landshut, Passau, Straubing (province of Lower Bavaria), Kaiserslautern, Landau, Speyer, Zweibrücken (province of the Palatinate), Ratisbonn, Amberg (province of Upper Pfalz), Baireuth, Bamberg, Hof, Wunsiedel (province of Upper Franconia), Anspach, Erlangen, Nuremberg, Fürth (province of central Franconia), Wurzburg, Aschaffenburg, Schweinfurt (province of Lower Franconia), Augsburg, Kaufbeuren, Kempten, Lindau, Neuburgh, Nördlingen (province of Swabia).

The school year at these institutions begins on the 1st of October and ends on the 15th of August following, and, in addition to the six weeks' vacation thus allowed, a holiday of a fortnight is given at Easter.

Each trade school is divided into three classes, and the course of instruction, and the number of hours devoted per week to each subject, as laid down in the Decree of 1864, are as follows:—

First Class.

Religion	2 hours.
German language	5 ,,
Geography	2 ,,
History	2 ,,
Arithmetic	5 ,,
Natural history	4 ,,
Drawing	8 ,,
French language	2 ,,
	30 hours per week.

Second Class.

Religion	2 hours.
German	4 „
Geography	2 „
History	2 „
Algebra	2 „
Plane geometry	4 „
Natural history	4 „
Drawing and embossing	8 „
French	2 „
	30 hours per week.

Third Class.

Religion	2 hours.
German	3 „
History	2 „
Algebra	3 „
Solid geometry and plane trigonometry	2 „
Demonstrative geometry	2 „
Chemistry	4 „
Popular mechanics	4 „
Drawing and embossing	6 „
French	2 „
	30 hours per week.

It is also provided that where, in accordance with the requirements of the locality, a commercial or an agricultural section (or both) shall be added to the regular establishment of the trades schools, each such section to have three classes, the course of instruction in which, as prescribed by the degree, is much the same as that of the three classes of the school itself in respect of all the ordinary subjects of education, but in the upper classes, matters connected with commerce in the one case, or with agriculture in the other, is substituted for geometry, trigonometry, mechanics, &c.

I may also mention that in connexion with, and attached to, one of the trades schools, namely, that at Passau, a special section has been organized in which the art of weaving is taught.

There is no reference in the decree to the mode in which instruction in religious matters is to be carried on at schools frequented by youths of different creeds, but I understand that this is provided for in these, as well as in all other public schools in Bavaria, by the division of the scholars into distinct classes, according to the religion they profess, each such class receiving instruction in religion in a separate school-room. And I may here remark that though Bavaria is nominally a Catholic State, a considerable portion of the population (rather more than one-third) profess the Protestant religion, and that there is perfect equality before the law, and indeed in every other respect, as between Catholics and Protestants.

The appointment of directors and teachers at the trades schools rests, as already mentioned, with the local Government authorities in

the case of those schools which are established and supported by the State or provincial funds, and with the magistracy when the school is founded by the commune or corporation; in the latter case, however, the appointments must be confirmed by the local government authorities. But the teachers at these schools do not in any case become *permanent Government employés*, their appointment being only temporary, in so far that it may at any time be revoked when their services are no longer required.

In order to be qualified for the appointment of teacher, the candidate must pass an examination in the subject which he professes to be competent to teach, but this examination is not competitive; indeed, competitive examination as understood in England is an institution unknown in any branch of the public service of this country.*

It is not an indispensable requirement for appointment as teacher to a trades school that the candidate should have gone through the regular course of study prescribed at any particular school or college.

According to the returns for 1863 the aggregate number of teachers employed at the twenty-nine trades schools was 343, the number at each school ranging from 6 to 23. The salaries of the teachers at these schools vary from 700 to 1,000 florins† per annum (about £58 to £83 sterling).

The qualifications for admittance as a scholar to the first or lower class of the trades school are, that the candidate should have completed his twelfth year (the age at which the six years' attendance at the national schools ceases), and shall not have exceeded his fourteenth year, and he must prove by means of a test examination that he possesses a proper knowledge of religion, that he is able to read fluently and write from dictation, that he can indite a piece of plain composition without any gross mistakes of spelling or phraseology, and that he is master of the four rules of simple arithmetic.

The annual charge for admittance for each scholar is fixed by the decree above-mentioned, at not less than 5 florins (8*s*. 4*d*. sterling), but it is provided that in cases of well authenticated want of means, this charge shall be dispensed with, and the scholar be admitted free of all payment.

I am informed, however, that 5 florins per annum, as fixed by the decree, is a minimum charge (where payment is exacted), and that the sum actually paid for admittance to these schools varies from 6 to 12 florins per annum (10*s*. to 20*s*.).

Besides the regular scholars who follow the whole course of study laid down for each class in the school, special scholars, known as

* The system on which examinations for all the upper branches of the public service in Bavaria is organized, is the following:—

At certain periods of the year open-examinations, known here as the "Staats concours" or "State competitions," are held in the chief town of each of the eight provinces, by commissioners specially appointed by the Government, and before these commissioners all persons seeking employment in any one of the various branches of the civil service are at liberty to present themselves.

The scope of the examinations and the number of marks to be obtained (as a minimum) are fixed within determined limits, according to the nature of the different classes of appointments; and all persons who attain the required standard, or rise above it, receive a certificate of qualification of the 1st, 2nd, or 3rd class, in proportion to the number of marks obtained. Their names are then entered according to the order of merit, each in his own particular sphere, on the general register of candidates in each province for employment in the different branches of the public service; and as appointments become vacant they are offered in succession to the candidates, the preference being given to those whose names stand highest on the list.

† The Bavarian florin is equal to 1*s*. 8*d*. sterling.

"hospitants," who only receive instruction in any one particular branch of education, may be admitted by special permission. The annual fee paid by them is half of that paid by the regular scholars.

The statistical returns for 1863 (the latest in the possession of the Bavarian Government) give the total number of scholars frequenting the 29 agricultural and trade schools during that year at 3,539; and, as far as I have been able to ascertain, the average number has not increased materially since that period.

Divided according to provinces, the number of the scholars and the religious confessions to which they belonged, were as follows:—

	Catholics.	Protestants.	Jews, &c.	Total.
Upper Bavaria	449	57	7	513
Lower Bavaria	250	4	..	254
Palatinate..	113	296	46	455
Upper Pfalz	185	56	2	243
Upper Franconia	137	256	40	433
Central Franconia	68	446	80	594
Lower Franconia	316	120	34	470
Swabia	339	205	33	577
Total	1,857	1,440	242	3,539

The largest number of teachers at any one trades school in the year to which the foregoing returns refer, was 344 (at Munich), and the smallest number 45 (at Neuburg, in the province of Swabia).

The trades schools are principally maintained, as already stated, by contributions from the State or the provincial funds, as by the municipal corporations; but they also derive some part of their revenues from the payments made by the scholars, and to some small extent from endowments and from subscriptions from private individuals, and from property belonging to the schools themselves.

According to the statistical returns already mentioned, the revenues of the 29 trade schools, with an aggregate of 3,539 scholars, amounted for the year ended September 30th, 1863, to a total of 255,264 florins, or £21,272 sterling, which was derived from the sources above enumerated, in the following proportions:—

	Florins.
From Government or from provincial funds* ..	175,449
,, municipal funds	41,970
,, payments made by the scholars	12,928
,, endowments	7,846
,, private subscriptions, and property belonging to the schools	17,071
Total	255,264

The subvention paid to each school from the Government and provincial funds varied from 1,000 to 14,379 florins; that from the municipal funds ranged from 50 florins to 4,060 florins.

The total expenditure of the 29 schools for the year in question was 252,215 florins, or £21,018.

The "fortbildungs-schulen," or "schools for further improvement

* In the return from which these details are taken, the sums contributed by Government and from provincial funds are not stated separately, but are both included under one head.

in education," were called into existence by the decree already referred to of the 14th of May, 1864, for the general reorganisation of the system of technical education.

The special object for which they were established was that of affording a means of education to apprentices or workmen who had not been able to attend the regular course of instruction at the trades schools, or giving to youths who, after having attended those schools, had entered upon a trade or handicraft, the opportunity of further improving the education which they had received. With this view, the classes are held on Sundays and holidays and also on the evenings of two working days in the week.

These schools are for the most part accessary to, and established in the same building as the trades schools, but in some cases they form separate institutions.

They consist of two divisions, namely, the elementary section, and the section for special trades or handicrafts.

The elementary section is intended to constitute a means for continuing and improving upon the course of instruction followed at the national schools; the special section, as an institution for instruction in matters connected with trade and commerce, and for applying the theoretical knowledge acquired to the practical exercise of a particular trade or handicraft, the character of such trades or handicrafts being regulated according to the requirements of the particular district in which the school may be established.

In the elementary section, the subjects taught are the following:—

Religion.
German language (composition, commercial style, &c.).
Arithmetic.
Drawing.

In the special sections—
Drawing, in its several branches.
Embossing and modelling.
Arithmetic, and its application to trade and commerce.
Geometry.
Natural history.
Chemistry.
Knowledge of the different articles and substances constituting the staples of trade and commerce.
Mercantile bookkeeping.
Practical exercises in different trades and handicrafts.

These schools, in so far as they are established as independent institutions, and not as branches of the trades schools, are supported chiefly from the communal funds, or other local sources, and are under the direction of the magistracy or town authorities.

Instruction in the elementary branches of education is given as a general rule by the teachers at the trades schools; instruction in trades or handicrafts by practical workmen engaged in those callings, who are specially employed by the school authorities for this purpose.

The only qualification necessary for admittance as a scholar at these institutions is that of having attended the national school during six years, as required by law.

The instruction afforded at them is given almost without an exception, free of all charge. According to a statement which lately appeared in the semi-official journal of Munich, there were at the beginning of the present year 14 of these schools in existence in Bavaria, either in connection with trades, or as independent institutions, and the number of scholars attending them was about 560.

I am informed that the establishment of this description of Sunday and holiday school has been much appreciated by the working classes, and that their number is being gradually increased.

Indeed I am assured by persons who are in a position to form a correct opinion on the subject, that the practical working of the trades and Sunday trades schools, and the general effect of the education afforded by them to the operative class in this country, is most satisfactory, the result being that the educational standard of that class in Bavaria is in many respects higher than that of the corresponding class in some of the most enlightened States of Germany.

Next in the order of institutions for technical education in Bavaria, come the so-called "real gymnasiums," which were also first established by the decree of 1864, already referred to. The object of these institutions, as described by the decree, is to give to those youths who have already gone through the complete course of education prescribed in the inferior order of schools, "the requisite preparation for entering upon the study of a profession which demands an intimate acquaintance with the exact sciences."

The course of study laid down for these institutions is consequently of a higher grade than that of the trades schools, so much so, indeed, as to make of them rather what would elsewhere be considered as preparatory establishments for scientific education than as technical schools. The regulations require also on the part of students seeking admittance, a previous knowledge of some branches of learning, such as Greek and Latin, which are not comprised in the programme of the studies of the trades schools.

The real gymnasium, which, like the trades schools, are exclusively day schools, are six in number, one being established in each of the following chief towns of provinces, namely:—

Munich.
Spires.
Ratisbon.
Nurembergh.
Würzburgh.
Augsburgh.

They are all Government, or "State" institutions, are under the immediate control of the central authority, and are supported at the expense of the State; for, as will be seen, the annual charge for the admittance of a student is so small, that but a very inconsiderable portion of the expense of these establishments can be defrayed from that source.

Each gymnasium is divided into four classes, or "courses," as they are termed, the course of study prescribed for each class being the following:—

First Class.

Religion	2 hours per week.
Algebra	4 ,,
Plain geometry	3 ,,
German language.. ..	4 ,,
Latin ditto	4 ,,
French ditto	4 ,,
Geography	3 ,,
Drawing	6 ,,
	30 hours per week.

Second Class.

Religion	2	hours per week.
Algebra..	3	,,
Plain geometry	2	,,
Natural history (zoology and botany)	4	,,
German language	3	,,
Latin do.	4	,,
French do.	4	,,
Geography	2	,,
Drawing	6	,,
	30	hours per week.

Third Class.

Religion	2	hours per week.
Solid geometry	2	,,
Algebra and trigonometry	4	,,
Physics	5	,,
Demonstrative geometry ..	2	,,
German language	2	,,
Latin do.	3	,,
French do.	3	,,
History	2	,,
Drawing and embossing ..	6	,,
	31	hours per week.

Fourth Class.

Religion	2	hours per week.
Elements of higher analysis	2	,,
Analytical geometry ..	2	,,
Demonstrative geometry ..	3	,,
Mineralogy and chemistry	5	,,
Latin language	3	,,
French do.	2	,,
English do.	4	,,
History	2	,,
Drawing and modelling ..	6	,,
	31	hours per week.

The scholastic year commences on the 1st of October and ends on the 15th of August. At Easter a holiday of a fortnight is allowed.

For admission into the first or lower class of these colleges, the student must be not less than thirteen and not more than sixteen years of age, and must have gone through the four classes of a Government Latin school, or possess all the requirements supposed to be possessed by those who have attended those four classes, and to prove this the candidate for admission must pass satisfactorily an examination to be held by the rector and the committee of teachers of the school, in the following subjects:—Religion, Latin, Greek, German, Mathematics, History, and Geography.

For admission to one of the upper classes of the school, an ex-

amination must be passed in the subjects taught in the class immediately below it. The same examination must also be passed by a scholar before he moves from an inferior to a superior class.

The annual sum to be paid by each scholar is fixed at 20 florins, £1 13*s.* 4*d.* sterling.

But, as is the case at the trades schools, the sons of parents known to be in poor circumstances, are admitted free of charge on a representation to that effect being made to the school authorities.

Special scholars or "hospitants" are only received exceptionally, and in virtue of a permission to be granted by the chief authorities of the province. If the hospitant only attends one special course of study, he pays half the usual annual entrance money, if more than one course, the whole amount.

On completing the course of study in the four classes of the school, the student must go through a detailed examination in each of the various subjects taught, and on obtaining a certain number of marks he receives a definitive certificate, or "absolutorium," of the first, second, or third class, according to the degree of proficiency displayed.

The qualifications required of a teacher at these colléges are, that he shall have received the "absolutorium" of a Latin school, and of the Polytechnic School, and that he shall have devoted not less than one year to the study at one of the universities of the particular science or subjects which he professes to teach, and he must also have passed the Government examination already described as necessary for all persons entering the service of the State.

The teachers are appointed by Royal Decree, and become thereby regular *employés* in the Government service, with all the prospective rights in regard to pension, &c., which belong to that position.

Polytechnic Schools.

Of these schools there were originally three in Bavaria, namely, one at Munich, one at Nuremberg, and one at Augsburgh, but on the reorganization of the system of technical education in the year 1864, the latter of these three establishments was transformed into a special school of machinery.

They are Government institutions supported by the State, and the course of study prescribed for them being in direct relation with and following immediately upon that of the real gymnasiums, forms the culminating point of the system of technical education as known in Bavaria.

Each school has one general section for instruction in mathematics and the natural sciences in their higher branches, and a special section for each of the following four branches of technical science or knowledge:—

Architecture, Machinery, Chemistry } with a course of study of two years' duration.

Trade and commercial intercourse, with a course of study of one year.

The studies in all the sections of these schools (excepting that for commerce) are of a highly scientific and complicated nature, and it is perhaps unnecessary for the purposes of this report that I should enter into a detailed description of them, even if I were competent to render correctly into English the various technical and scientific terms made use of in the German text of the *programme* of studies. But I annex

hereunto a copy of the Royal Decree of 1864 on the re-organization of the technical institutions in Bavaria, in which a minute specification will be found of the various subjects of instruction, and the measure of each, as laid down for the different classes of the polytechnic schools, as well as for those of the real gymnasiums and the trade schools.

The general regulations with respect to the appointment of professors and teachers at the polytechnic schools are the same as those prescribed for the real gymnasiums, and the salaries paid at the one and the other vary from about 800 to 2,000 florins (£67 to £167) per annum, the latter being almost a maximum, and such as is only awarded to men of superior attainments, though in some rare cases even more is paid to secure the services of a professor of high repute.

The periods at which the scholastic year commences and ends, and the regulations respecting vacations are the same at the polytechnic schools as at the real gymnasiums.

For admission to the general section of the school, the candidate must have received the "absolutorium" of a real gymnasium, or must pass an examination in all the subjects taught in the upper class of those institutions. A similar qualification is necessary for admission to the special sections, and the student must in addition prove, by means of a test examination that he possesses the requisite degree of preliminary knowledge of the subjects of study prescribed for such sections. Under the last-named condition "hospitants" may be admitted to the general as to any one of the special sections. The regulations do not lay down any limit with reference to the age at which scholars may be admitted. As regards the cost to a student at the polytechnic schools, both the regular scholars and the "hospitants" pay a fee of 5 florins as entrance money on their first admission, and in addition to this the sum to be paid by the former is fixed at 20 florins each half year for the whole course of general instruction, and 15 florins per half year for participation in the practical exercises of the chemical laboratory.

The "hospitants" pay from 4 to 6 florins per six months, according to the particular course which they attend, and 20 florins for admission to the laboratory.

The whole as any part of these charges may, however, be remitted by the school authorities, in the same manner as at other Government institutions, in favour of poor students.

On the completion of his course of study and on successfully passing the necessary examination, the student receives, in the same manner as at the gymnasiums, the final certificate of competency, or "absolutorium" of the institution, of the first, second, or third class, according to his merits, the first-named being the highest grade of diploma in technical science known in Bavaria.

According to the statement of the semi-official journal already referred to, the number of students frequenting, at the commencement of the present year, the two polytechnic schools of Munich and Nuremberg was as follows:—

Munich	115 regular students,
	48 hospitants.
Nuremberg	55 regular students,
	20 hospitants.
Total	238

The special school of machinery at Augsburg is organized on much the same footing as the polytechnic schools.

The course of instruction is divided into two theoretical classes and

one practical class, the subjects of study in the former being:—mathematics, trigonometry, physics, geometry, machine drawing, and the theory and construction of machinery (from 2 to 5 hours each per week), and in the latter, the practical processes connected with the manufacture of machinery are taught during not less than two hours daily, Saturdays excepted.

The teachers and professors are appointed under the same conditions as those in the polytechnic schools.

Scholars are not admitted until they have completed their fifteenth year, and they must pass a preliminary examination in algebra (including logarithms, &c.), and in linear drawing. "Hospitants" are admitted if they possess the necessary previous acquirements.

The annual charge for each regular student is 20 florins, for a hospitant 10 florins, in each case with the usual proviso as regards students who are in needy circumstances.

At the commencement of the present year there were employed at this school three professors and one drawing master, besides two practical instructors in the mechanical workshop. The school was attended by 25 students.

Amongst the few unimportant industrial schools of a special character, referred to at the commencement of this report, and concerning which I have been able to obtain any information, the one which seems most worthy of particular notice is a school for weaving which was established a few years ago by the district authorities of Münchberg, a small place near the manufacturing town of Hof, in the province of Upper Franconia. It is calculated to accommodate sixteen regular scholars, who are lodged and boarded in the establishment at an annual charge of 150 florins (about £12 10*s.*) for Bavarian subjects, or 200 florins (about £16 13*s.*) for strangers. The scholars must be not less than 14, nor more than 22 years of age, and each scholar must, on admission undertake to remain two years in the establishment. There are at this school two theoretical and two practical classes.

In the former instruction is given in the ordinary branches of education (German, geography, arithmetic, and drawing), in matters connected with the theory and preliminary processes of weaving, and also with respect to the nature of the different materials employed in the manufacture of woven goods; and in the practical classes the art of weaving in all its varieties is taught.

Workmen who have already learnt more or less of their trade as weavers, but desire to improve themselves, are also admitted as scholars. These pay at the rate of 10 kreutzers, or about 3½*d.* per day, for their board; and in consideration of their lodging, and the instruction they receive, the school retains one half of the sum which their daily work at the looms, during their stay at the school, is calculated to represent. The other half remains their own.

Instruction in all the different subjects taught at the school is also given on Sundays, from one to three o'clock in the afternoon, free of all charge, to masters, journeymen, or apprentices indifferently, and whether weavers by trade or not.

Between the directors of the school and the proprietors of some manufactories established in the neighbourhood, an arrangement has been come to, in virtue of which the latter supply the materials, as well as the patterns required for the use of the practical section of the weaving school, and pay the usual price for the work done when those materials are returned to them in the form of made up goods.

The staff of teachers consists of one special instructor in weaving of every description, who is at the same time the head master, or

manager of the school; of one teacher for the various branches of ordinary education, and one assistant instructor in weaving, the latter being chosen from amongst the most expert of the journeymen who attend the school.

There is further at Berchtesgaden (near the Salzburgh frontier of Austria) a day school, established by the district authorities, and supported by local public funds, with the object of promoting and improving an industry which has long been carried on by the inhabitants of that mountainous district, namely the art of carving in wood and bone, and the manufacture of ornamental articles of various descriptions from those materials.

The course of instruction at this school consists of drawing, modelling, and carving from drawn patterns; and it is open, free of charge, to the children of all persons domiciled within the district, provided they have complied with the law respecting attendance at a national school. Children from other districts are only admitted in so far as there may be room to accommodate them in the school, and on payment of a stipend to be agreed on with the directors.

Four years is the usual period of attendance of the scholars, and after leaving the establishment, they are at liberty, with the permission of the master, to copy the models belonging to it, and to exhibit their works and dispose of them in the show-room of the institution. The establishment would seem to be on but a small scale, as the prospectus only speaks of one master, who is charged apparently with the whole course of instruction afforded. His salary is fixed at £52 (620 florins) per annum.

In connection with the various technical and other institutions referred to in this report, I annex herewith copies of the reports for the year 1866-67, addressed to the Bavarian Government by the authorities of the following schools:—

Sunday and Holiday National Schools, at Munich.

Trade Schools, at Passau, Munich, Landau, Ratisbon, Bayreuth, Hof, Bamberg, Anspach, Fürth, Augsburgh, Kempten, Nördlingen, and Lindau.

Real Gymnasiums, at Nuremberg and Augsburgh.

Polytechnic School and Trades School (in one pamphlet), at Nuremberg.

School of Machinery, at Augsburgh,

Prospectus of the School of Art, as applicable to trades, at Nuremberg; of the Weaving School, at Münchberg; and of the Wood Carving School, at Berchtesgaden; all of these being public institutions, established by the central or local authorities. And I further annex the report for 1866-67, of the Polytechnic Society's School at Würzburgh, and of the Commercial School at Nuremberg, both of which are private establishments.

H. P. FENTON.

Munich, December, 1867.

No. 8.

Lord Howard de Walden to Lord Stanley.—(*Received December* 25.)

My Lord, *Brussels, December* 24, 1867.

In accordance with the instructions conveyed in your Lordship's despatch of July 17, I have the honour to inclose a report which has

been drawn up by Mr. George Petre, upon the subject of industrial and technical education in Belgium.

I have, &c.

(Signed) HOWARD DE WALDEN AND SEAFORD.

Inclosure in No. 8.

Report on Industrial and Technical Education in Belgium.

THE origin, the progress, and the actual condition and organisation of the various industrial schools and institutions established throughout Belgium, for promoting, according to the special requirements of particular localities, the technical education of the working classes, and for raising generally the standard of industrial skill in this country, were reviewed for the first time collectively, in a clear and exhaustive report, drawn up and presented to the Belgian Legislative Chambers in April last, by the Minister of the Interior.

I inclose a copy of this report.*

In replying *seriatim* to the heads of questions relating to the subject of industrial education, upon which I am called upon to furnish information, it may serve to render my statement more complete, if I preface it by a brief notice of the date and origin of the establishment of the system, as it exists in Belgium.

With the exception of the industrial school of Ghent, and of the "Musée de l'Industrie," which were founded under the Dutch Government, none of the present industrial educational institutions of Belgium existed prior to the Revolution of 1830, and the great majority have been established at various intervals within the last 20 years. The "Ecoles d'Industrie" sprung up for the most part in the chief centres of industry, originating in the enterprise and foresight of individual manufacturers or of local authorities, and subsidized in all cases by communal or provincial funds, and in many by the State.

The "Ateliers d'apprentissage," a detailed description of which will be given later on, were originally established in 1841, with a view of relieving the distress into which the rapid decline of the linen industry of Flanders had plunged the working population of those provinces, of giving a more extended and diversified character to their labour, and of encouraging an improved system of manufacture by the supply of new machinery and of competent teachers, and by furnishing the indigent with the raw materials, free of cost. Large subsidies were voted by the Chambers in furtherance of these objects, and the "Ateliers" in this their earlier phase, were not only instrumental in mitigating the general pauperism and distress which prevailed, but they also contributed largely to revive the industrial energies of the working classes.

The appeals which were made to the Belgian Government to contribute towards the support of the "Ecoles Industrielles," induced them to issue a commission of inquiry into their general organisation, and into the influence which they exercised upon the industry of the districts in which they were situated. The result of this inquiry was the re-organisation in 1860 and 1861, of the whole system of industrial and technical education, both "Ecoles Industrielles," and "Ateliers d'Apprentissage" being placed under Government supervision, with

* See Appendix, page 191.

such uniformity in the regulations as was found to be compatible with the requirements of the different branches of industry prevalent in each locality. The State contributing henceforth to the support of all the schools and "Ateliers," without exception, in a proportion which will be stated further on, assumed a direct supervision and control over them, in conjunction with the communal and provincial authorities.

The establishments existing in Belgium for purposes of industrial or technical education are divided, as indicated above, into two distinct classes, the "Ecoles Industrielles," and the "Ateliers d'Apprentissage." In the former a higher standard of instruction is given, both theoretical and practical, in various branches of industry; in the latter, which are peculiar to the two Flanders, the instruction is exclusively practical and devoted to the purpose of creating skilful artizans in one particular branch, viz., the weaving trade, which still continues to be the staple of the once famous industry of those provinces.

The "Musée de l'Industrie" at Brussels, and the "Ecole Industrielle des Mines du Hainaut" must be classed, at all events the latter, in a category distinct from either of the two above-mentioned.

The "Ecole Industrielle des Mines du Hainant" is a kind of industrial college, not as its name would imply, exclusively devoted to metallurgy, but affording a superior class of instruction in various industries.

The "Institut Supérieure du Commerce" at Antwerp, though included in the ministerial report is a purely commercial college.

The "Ecoles Industrielles," including in the list the Musée d'Industrie at Brussels, are 14 in number, and are situated at Bruges, Courtrai, Ghent, Charleroi, les deux Houdeng, Soignies, Tournay, Liège, Huy, Seraing, Verviers, Hasselt, and Namur.

Although the principles upon which these schools are organized and the course of professional instruction which they give vary according to the special necessities of each locality, there are certain general rules and heads of instruction which are common to them all. By stating what these are I shall at the same time answer, if not in their precise order, the specific questions relating to this subject which have been put by Her Majesty's Government.

The general course of instruction common to all the industrial schools comprises:—mathematics and mechanics, in so far as they bear upon industrial science, linear and ornamental drawing, physics, general and practical chemistry, varying in each school according to the industries which it is more especially intended to promote. The other heads of instruction comprise the elements of mineralogy, technical drawing, with a special view to the manufacture of stuffs, carpets, &c., and to the construction of machinery, the elements of metallurgy, and the art of mining, a theoretical and practical study of the various processes of textile manufactures, and, in some cases, the mechanism and management of steam-engines.

With the exception of the "Institut Supérieur du Commerce," which, as stated above, I exclude from the class of industrial training establishments, the education is given at these schools entirely free of cost to the students, and the course of instruction varies from two to four years, but it usually occupies three; in nearly all cases it is accompanied by participation in actual processes of manufacture, more especially of textile manufacture.

The qualifications required for admission are, that the pupil be above the age of 14, or in some instances of 12, and that he possesses that rudimentary knowledge which is to be acquired in the upper classes of the primary schools, or in the preparatory schools or evening classes

which are attached for the purpose to many of the "Ecoles Industrielles."

Every candidate for admission has to undergo a pass examination before a board composed of the director and professors of the school, and those who fail to pass are allowed to frequent the preparatory school or evening classes until they have acquired the necessary degree of proficiency. The examinations are both written and oral.

As a general rule only male students are admitted to the "Ecoles Industrielles," but girls are allowed to attend the drawing classes, and the lessons given in the use of the sewing-machine and in photography at the school of Ghent. In Brussels there is a professional school expressly for girls, which is subsidized by the State, and there are certain of the "Ateliers" in Flanders where they receive both primary and technical education.

All students admitted to the schools are required to undergo an examination at the end of each scholastic year, to qualify them for entering upon the course of instruction of the ensuing year. They are also subjected to an examination on leaving the school, in presence of a jury appointed by the managing board, and such as are successful receive a certificate of capacity varying in its terms according to the degree of proficiency shown by the student.

The school buildings are provided and maintained by the communal authorities.

The funds required for the annual support of the schools are derived from three sources, the commune or municipality, the province, and the State. The latter contributes in the proportion of about one-half, as may be seen by the following tabular statement extracted from the report of the Minister of the Interior:—

Year 1865.

Expenses.	Paid by the State.	Paid by the Provinces.	Paid by the Communes.	Total.
	fr. c.	francs.	fr. c.	fr. c.
"Musée de l'Industrie" ..	23,727 59	..	..	23,727 59
"Ecoles Industrielles" ..	105,531 95	33,600	81,632 17	223,764 12
Various institutions	2,700	..	9,300	12,000
Improving the apparatus ("matériel") in use at the schools	5,250	..	4,800	10,850
Total francs ..	113,481 95	33,600	98,732 17	269,541 71

With the exception of the school of mines and manufactures attached to the Catholic University, and what are called "écoles dentellieres" in Flanders, where little girls are taught lace-making in addition to reading and writing, there are no industrial schools in Belgium which do not receive aid from the State.

The management of each school is vested in the hands of a "commission administrative," or board of management of six or nine members, one-third of whom are appointed by the Communal Council, a third by the Permanent Committee ("Deputation Permanente") of the Provincial Council, and the remainder by the Minister of the Interior. In some instances the right of nomination is divided equally between the Communal Council and the Government. The director,

professors, or teachers, and overseers of the schools are usually appointed by the Communal Council, subject to the approval of the Ministry of the Interior. In some schools the appointments are made directly by the Government on the recommendation of the "commission administrative." The members of this commission, or a portion of them, vacate their seats every two or three years, but they are re-eligible. Their duties consist in regulating the internal management of the school, subject to the sanction of the Communal Council, in fixing the hours of instruction, and exercising, in fine, a general superintendence over the discipline and course of studies, and also in ascertaining from time to time, by personal inspection, that the regulations are strictly carried out.

The director and professors meet in council at the end of each scholastic year, and draw up a report upon the condition of the school, addressed to the Communal Council, and transmitted by the latter to the Minister of the Interior. They have no power to vary in any way the course or hours of instruction prescribed by the administrative commission, nor have they any concern whatever with the religion of the pupils, but they can enforce moral discipline and observance of the regulations, when necessary, by the temporary and even permanent exclusion of those who infringe them. Permanent exclusion of a student must be sanctioned, however, by the administrative commission.

The professors at the "Ecoles Industrielles" are in general selected from the Universities, or from the professional divisions of the "Athénées" or public schools. They are required to have passed an examination and to have received a "diplôme scientifique," or degree certifying to their scholastic acquirements; others are chosen from amongst students upon whom diplomas have been conferred at the "écoles spéciales" attached to the State Universities, or from engineers in actual employment at industrial establishments.

The classes at most of the schools are held in the evening, when the workshops are closed, and when all those employed in daily labour have leisure to attend; in some localities, however, there are day classes, particularly on Sundays.

No students are lodged or boarded in any of the industrial schools in Belgium. The total number of students frequenting these schools during the last scholastic year was 3,814.

A detailed description of each of the 14 "Ecoles Industrielles," of the "Ecole des Mines du Hainaut," and of the "Institut du Commerce," at Antwerp, stating the circumstances under which each school was established, the number of students attending each class, the nature of the subjects taught, and the general results of the year, will be found in Chapters II and III of the Ministerial Report of this year. The most important of these establishments is undoubtedly the industrial school of Ghent. It was founded when Belgium was still annexed to Holland but its importance is of much later date. In 1860, when the whole system of industrial education in Belgium was re-organized and placed under Government control, the school of Ghent was amalgamated with a special school of industrial drawing and weaving, which had been established in the same locality in 1852 for training expert draftsmen and weavers. The course of instruction lasts for years, and is so framed as to enable the pupils within that period to obtain a thorough knowledge either of chemistry in its application to industry, of the mechanical arts, of the science of textile manufacture, or of drawing for industrial purposes, according to the particular branch of industry they may wish to adopt.

The first year of instruction includes mathematics, descriptive geometry, linear and ornamental drawing, and bookkeeping.

The second year, mathematics, physics, mechanics, drawing of machinery, and ornamental drawing.

Third year: mechanics, chemistry, spinning, weaving, the motive powers of steam, drawing and plans of machinery, ornamental drawing, and composition.

Fourth year: chemical technology, dyeing, bleaching, printing, practical weaving, the analysation of samples, ornamental drawing in its application to industry, and industrial economy.

A class for steam machinery is attached to the school, for the special purpose of practically instructing engineers and engine-drivers in those branches of physical and mechanical science which are necessary for the proper exercise of their calling.

The classes are given both in the French and Flemish languages, and the average number of students in the year is about 900.

The following is a statement of the number of students who attended the general course, as well as those who attended the special courses of instruction at the School of Ghent, during the year 1866, inclusive of those who attended them, or part of them, without being actually entered as pupils :—

General course of instruction—Flemish ..	522
,, ,, French ..	235
Sunday drawing lessons, deducting those who attended other classes	93
Evening ditto	108
Industrial drawing (daytime)	8
Ditto (evening)	21
Preparatory drawing	23
Weaving and spinning	46
Stokers' course	30
Photography	59
Girls' drawing lessons	14
Lessons in the use of the sewing-machine ..	118
Total	1277

The ages and trades or professions of the 757 students attending the general course, both Flemish and French, were as follows :—

Flemish Classes.

Age.	Number.	Trade or Profession.	Number
From 14 to 17	.. 301	Fitters ("ajusteurs") ..	.. 68
,, 18 to 20	.. 111	Turners in iron	.. 28
,, 21 to 25	.. 39	Mechanicians	.. 27
,, 24 to 26	.. 35	Smiths and locksmiths ..	.. 84
,, 27 to 30	.. 16	Stokers	.. 8
Over 30	.. 20	Carpenters and cabinetmakers	.. 66
		Various	.. 223
		No particular trade.. ..	.. 18

French Classes.

Age.	Number.	Trade or Profession.	Number
From 14 to 17	.. 105	Manufacturers' clerks ..	.. 51
,, 18 to 20	.. 57	Draughtsmen (mechanicians)	.. 10
,, 21 to 23	.. 38	Fitters ("ajusteurs") ..	.. 2
,, 24 to 26	.. 19	Students	.. 49
,, 27 to 30	.. 7	Schoolmasters	.. 5
Over 30	.. 9	Various	.. 98
		No profession	.. 26

The teaching body consists of eight professors, including the director, and two assistant professors.

An industrial museum and a library, well stocked with the best works and periodicals on every subject connected with industry in all its branches, with a reading-room attached to it, are annexed to the school. The reading room is much frequented by the working classes; the number of books borrowed during the year 1866, amounted to 2,490, books exclusively relating to science and industry.

The annual cost of this school is about 28,000 francs (£1,120), two-thirds of which are contributed by the Government, and the remainder by the town of Ghent.

The Minister of the Interior, in his report, points out the beneficial influence which this particular school has exercised upon the town of Ghent, and upon its industry in general, and also to the successful career which it has opened to so many of its pupils, who have become foremen or overseers, managers, and heads of industrial establishments. He attributes the introduction of new local industries to the special education which artisan pupils have obtained at the school.

A full account, drawn from a summary of the annual reports of all the other schools, will be equally found in the ministerial report before mentioned. I have merely selected Ghent for special mention, as being the seat of the most important and flourishing among them, and as exemplifying their general mode of organisation and system of instruction.

The "ateliers d'apprentissage," of Flanders, form, as I have already stated, a distinct and lower group of technical schools, or rather workshops, established exclusively for the improvement of the textile industries of those provinces, by training skilled apprentices. There are at present 68 of these ateliers in the two Flanders, giving practical instruction and salaried employmnt to 1,857 apprentices and operatives in the various processes of weaving.

In page 142 of the Ministerial Report will be found an interesting statement, showing the nature of the manufacture carried on in each "Atelier," the number of looms it contains, and of the apprentices at work; the wages they receive distinguishing the apprentices from skilled operatives; the number of skilled operatives formed by each atelier since the date of its establishment, the names of the manufacturers supplying it with work, together with a mention of any special facts, showing the influence exercised by the ateliers upon the physical and moral condition of the working classes in the neighbourhood.

The distinctive features of the "ateliers d'apprentissage" are, that they combine primary education with technical teaching, and that the apprentices who frequent them, at the same time that they learn their craft, receive also the wages of their labour, according to the degree of proficiency which they have attained. The apprentices and operatives employed in them work entirely for the manufacturers of the neighbourhood, who supply the raw materials and pay the wages.

The hours of labour are limited to 12 as a maximum, and two of these are devoted to primary instruction by the communal schoolmaster. The apprentices are taught reading and writing, and the rudiments of arithmetic. No pupil is allowed to frequent the "atelier," under 12 years of age, but exceptions to this rule are occasionally made in favour of those who have already received primary instruction. The parents of apprentices who are in easy circumstances may be called upon to pay a premium, the amount of which is fixed by the administrative commission. The latter is charged in each commune with the direction and management of the "ateliers," and its members

are appointed, on the recommendation of the communal authorities, by the governor of the province, for three years.

The technical instruction given in the "ateliers" is placed under the control of intelligent foremen, appointed by the administrative commissions; they are required to prove, in addition to a knowledge of reading, writing, and arithmetic, their ability to instruct the apprentices in all the theoretical and practical details of the industry taught in the "atelier," more especially in setting up looms, &c. The wages of apprentices working in these establishments vary from 35 centimes ($3\frac{1}{2}d.$) to 1 franc a day, the skilled workmen earn from 1 franc 70 cents. ($17d.$) to 2 francs a day, or even more.

Such of the apprentices who have distinguished themselves by their skill and good behaviour, receive on leaving the "atelier," a present in money, to assist them in the purchase of necessary and improved materials for exercising their industry at home.

The annual cost of maintaining the 68 "ateliers d'apprentissage," is about £3,500, and is defrayed, as in the case of the "ecoles industrielles," by the commune, the province, and the Government, in proportions which are shown in the following statement of the expenditure in 1865:—

Expenditure.	Paid by the State.	Paid by the Province.	Paid by the Commune and the Bureaux de Bienfaisance.	Total.
	fr. c.	fr. c.	fr. c.	fr. c.
West Flanders, ordinary expenses	36,598 07	15,718 16	17,435 03	69,751 26
East Flanders, ditto	9,463 50	4,509 04	3,517 50	17,490 04
Apparatus for Ateliers	8,300	3,900	..	..
Travelling expenses of Inspectors	2,465 60	..	..	..
Total francs	56,827 17	24,127 20	20,952 53	87,241 30

The benefits which these institutions have conferred and are conferring upon the working population of Flanders, as regards their material prosperity in resuscitating a decayed industry, and in opening a career of remunerative labour to all who are willing to avail themselves of the opportunity placed within their reach, whilst teaching them at the same time early habits of discipline and order, are incontestible.

On the general and larger question of the advantages resulting from the whole system of industrial and technical education in Belgium in promoting or extending the manufactures of the country, it is hardly possible as yet to speak with any degree of certainty. The real importance of the system dates only from its reorganisation under Government control in 1861, and sufficient time has not yet elapsed to test its efficacy in that direction. That it encourages elementary education, however, is obvious, for the possession of a fair amount of elementary knowledge is made an indispensable qualification for admission to the "ecoles industrielles," and in the case of the "ateliers d'apprentissage" primary instruction is in all cases associated with professional teaching.

The employers of labour in this country appear to be fully alive to

the benefits which must eventually result from a well organised system of industrial education, but I believe that the working classes generally are slow to appreciate those benefits, and that they show but little eagerness to send their children to the schools.

GEORGE PETRE.

Brussels, December 20, 1867.

No. 9.

Lord Lyons to Lord Stanley.

My Lord, *Paris, December* 18, 1867.

I HAVE the honour to transmit herewith a despatch addressed to me by Mr. Fane, requesting me to forward to Her Majesty's Government the information which, in obedience to your Lordship's instructions, he has obtained respecting the technical or industrial education which is given in France.

I have, &c.
(Signed) LYONS.

Inclosure 1 in No. 9.

Mr. Fane to Lord Lyons.

My Lord, *Paris, December* 17, 1867.

WITH a view to carry out the instructions conveyed in Lord Stanley's despatch of the 17th of July last, I made application to the Minister of Public Instruction to be good enough to furnish me with the fullest information respecting the technical or industrial education which is given in France. His Excellency, in giving effect to my request, has had the goodness to cause an original report to be drawn up for me, with a special view of answering the table of questions submitted by the Royal Commission appointed to inquire into this subject, copies of which I furnished to his Excellency.

I have the honour of forwarding to your Excellency, for transmission to Her Majesty's Government, the report in question*, together with its numerous inclosures, a list of which will be found attached to the report itself.

I have, &c.
(Signed) JULIAN FANE.

Inclosure 2 in No. 9.

Liste des Documents Annexés.

EXPOSÉ DE LA SITUATION DE L'EMPIRE, 1867.

Enseignement Primaire.

Bulletin Administratif de l'Instruction Publique 1850, Mars No. 3.
Loi du 19 *Mars*, 1850, *sur l'Enseignement Primaire*, page 57.

* See Appendix, page 169.

Loi sur l'Enseignement Primaire du 11 Mars, 10 Avril 1867.
Statistique de l'Instruction Primaire pour l'Année 1863.
Exposé Général de la Situation de l'Instruction Primaire au 1er Janvier 1867.
Statistique. Degré d'Instruction des Adultes 1866, et Ecoles Communales Gratuites.
Statistique des Classes d'Adultes. Situation au 1er Janvier 1866.
Statistique des Cours d'Adultes pour l'année 1866-1867. Situation au 1er Avril 1867.

Enseignement Secondaire Spécial.

Bulletin Administratif de l'Instruction Publique 1865, No. 73. Loi du 21 Juin 1865, sur l'Enseignement Secondaire Spécial.
Décrets, arrêtés, programmes et documents relatifs à l'exécution de la Loi du 21 Juin 1865, imprimé en 1866.

Enseignement Technique.

Projet de Loi relatif à l'Enseignement Technique et Exposé des Motifs 1867.
Enquête sur l'Enseignement Professionnel—2 volumes publiés par les soins du Ministère de l'Agriculture, du Commerce et des Travaux Publics.
Note sur le Service de l'Enseignement Professionnel de l'Agriculture.
Circulaire de Ministre de l'Agriculture, etc., aux Préfets sur les Ecoles Impériales d'Arts et Métiers, 1 Mars 1866.
Programme des Conditions relatives à l'Admission des Elèves à l'Ecole Impériale Centrale des Arts et Manufactures.
Ecole d'Horlogerie de Cluses (Haute-Savoie). 1. Décret d'Organisation; 2. Arrêté portant Règlement.
Circulaire du Ministre de l'Agriculture, &c., aux Préfets.
Envoi d'un nouveau Règlement sur les Ecoles Vétérinaires, 23 Avril

Enquête du Xe Groupe. Exposition Universelle de 1867.

No. 10.

Mr. Bonar to Lord Stanley.

My Lord, *Vienna, January* 9, 1868.

I HAVE the honour to inclose to your Lordship herewith a report which I have drawn up on the technical and industrial schools of Austria.

Your Lordship has already been informed by Lord Bloomfield, in his despatch of the 26th of November last, that the Imperial Government have declared their complete inability to furnish, save after a considerable lapse of time, adequate answers to the list of queries on this subject, contained in your Lordship's despatch to Lord Bloomfield of the 10th of August last. The Austrian Government set forward that the organization and management of the public schools of Austria are left in many of their details to the provincial administra-

tions, and that it would therefore require a great length of time to collect all the information demanded by Her Majesty's Government, and still more to arrange those materials in a proper and useful order. Various endeavours, which I subsequently made in person at the Departments of the Interior and Public Instruction, with a view to obtain information on this subject, were also completely fruitless.

Under these circumstances I have thought it expedient to take as example of the schools of Austria, those of a principal province, Lower Austria, whose centre is the capital, whose schools are reputed to be the best organised and conducted in the empire, and regarding which alone I should be in a position to procure authentic data.

Having placed myself in communication with various competent persons, visited in person the best of the technical schools of Vienna, and obtained from various teachers and other authorities of those schools the most practical information I could collect, I venture to hope that my present report, though necessarily incomplete as regards the whole empire, will, in its general remarks, answer the purposes of the Committee of the Privy Council on Education.

I have further answered as many of the queries as were capable of being met, and I inclose numerous papers and works bearing upon the common organization of these schools, their administration, yearly reports, &c.

I have, &c.
(Signed) A. G. G. BONAR.

Inclosure in No. 10.

General Remarks.

The technical and industrial schools of Austria may be classed in the following order:—

1. "The gewerbe schulen," or industrial schools.
2. "The bürger schulen," civic or municipal schools.
3. The "real gymnasien," combined technical, Latin schools.
4. The "real schulen" (upper and lower), technical schools.
5. The "technischen hochschulen," technical academies.

Up to the present period a common organisation, under supervision of the State, prevailed throughout the schools of each respective class, slight differences occurred in their administration alone. During the late session of the Reichsrath, however, a law was passed, placing the popular education in each province of the empire under the authority of its own Diet. Distinct laws and regulations obtain also in the separate kingdom of Hungary.

Taking as a practical example of the schools of Austria as till now established, those of the province of Lower Austria, of which the capital is the centre, and whose schools are generally considered to be the best conducted, I may describe their organization and management as follows:—

The "Gewerbe Schulen," or Industrial Schools.

The industrial schools of Vienna are placed, as regards elementary instruction, in connection with the popular primary schools, inasmuch as boys who, after passing through four, in some cases only three

classes of the primary, enter the industrial schools, are enabled to continue and partly repeat their former studies during three evenings, and the forenoon of Sunday per week, under specially appointed teachers.

Besides the above there is also a superior class connected with the technical schools, and requiring a course of two years' attendance, in which drawing, themes, arithmetic, natural philosophy, and mechanics form the chief subjects of instruction.

These schools are frequented by the youngest class of apprentices (beginners, or lehrjunge). Special schools for higher apprentices and masters do not exist.

The students pay no fee.

The schools are supported as follows :—

The Trade Unions pay	70	per cent.
Vienna municipality..	12	,,
The Lower Austria Provincial Fund ..	10	,,
The Chambers of Commerce and Industry..	8	,,

The inferior class of teachers receive 70 florins (£7) per year for every hour per week of instruction—the professors of the technical school receive 100 florins (£10) on the same conditions.

Besides the above courses there are at Vienna also special and unions schools for weaving, tailoring, &c., &c., and numerous private schools where drawing and modelling are taught for a moderate fee.

The "Bürger Schulen"—Civic or Municipal Schools.

The so-called civic or municipal schools are schools combining popular primary instruction with two or three classes (years) of the technical schools.

Vienna and Lower Austria have but few of this class.

The requisite qualification for teachers in the civic schools is a two years' course in an upper technical school under the State—and they have to pass an examination after that time.

For admission to that preparatory course it is necessary to have passed a complete technical school or a gymnasium.

The "Real Ggmnasium," or combined Latin and Technical School.

The technical Latin schools have four classes (years). To enter them it is necessary to have passed the primary school.

In these schools Latin as well as drawing are compulsory objects of instruction—these schools being preparatory as well for the higher technical, as for the upper gymnasium or Latin school. Students destined for the former are instructed in French, for the latter in Greek.

Teachers at these schools are required to pass before a "Scientific Commission," an examination similar to that of the professors in the Latin or technical schools.

The "Real Schulen"—Technical Schools.

The technical schools comprise six classes and years, and here also candidates for admission are required to have passed the primary

school. These schools are preparatory for the technical professions—for the class of so-called "Manipulations Beamten," officials for instance in the post and telegraph departments, &c., as also for the technical academy.

The student fee for the three lower classes is 10 florins (£1 sterling), for the three higher 20 florins (£2 sterling) per year.

The salary of the professor is from 1,000 florins (£100) to 1,400 florins (£140), with 120 florins (£12) for house-rent, per year.

The qualification for a professorship requires a course of at least three years at an academy, and to have passed the special examination appointed for teachers.

At the technical school twelve regular teachers, and from one to three assistants are employed.

The "Technische Hochschulen"—Technical Academies.

To the technical academy at Vienna, which is divided into professional sections, only candidates who have passed a technical or Latin school are admitted, and they are subjected to a previous examination.

Answers to some of the Questions specially.

IV. The technical schools are supported either by the municipality, or by the provincial fund, or again by Government.

Thus there are at Vienna:

Three technical "middle" schools supported by the municipality.

Two technical Latin or real gymnasium supported by the Provincial Fund.

Two Upper Technical, or real gymnasium, by the State.

In the country towns of Lower Austria there are principally "middle" schools supported by the Provincial Fund.

There are also private schools which are supported by the high rates of the student fee.

V. The number of students is very various. The Imperial Upper Technical School of Schottenfeld (Vienna) counted last year (1866) 143 students.

VI. For the indigent student there exist both State and private foundations, but they are not considerable.

VII. At all the technical "middle" schools, candidates have to pass an examination before admission. This is held to be indispensable, because the course and mode of instruction at the primary schools occasionally vary, and are in some instances even defective.

The subjects of the examination are: German language and arithmetic.

VIII. The following are the subjects of instruction at the technical schools. Religion, German language and literature, two other modern languages, geography, history, arithmetic, algebra, geometry, chemistry, natural philosophy, natural history, geometrical drawing, practical geometry, drawing, modelling, and calligraphy.

Some of the above are experimental lectures, but participation in actual manufacturing processes (atelied) does not exist.

The course of instruction at the technical schools extends over six years.

The number of hours of instruction is—in the industrial schools from eight to twelve per week—in the middle schools circa 30.

The students generally enter the technical schools at the age of ten to twelve years.

There are no public middle schools for females.

The industrial schools hold examinations each year—but not the technical schools. However, students at the latter receive a certificate, with which they may, if so disposed, enter the superior classes. This certificate is based upon the results obtained during the foregoing year.

IX. There is complete freedom of trade.

No special education or qualification is required by law for admission to the exercise of any particular trade or profession, or establishment to master.

X. Teachers, after having exhibited the required qualification, are appointed by the authorities under whose special department the establishment is placed to which they are to belong.

XI. In Lower Austria there is no technical school or college where students are either boarded or lodged. They attend lessons from their own homes or lodgings, and are admitted to the school only at the hours appointed for instruction.

The Roman Catholic students attend Divine Service in common on Sundays, and have religious instruction at the school.

Students of other beliefs are instructed in religion by special teachers of their own persuasion, and are bound to exhibit a certificate every six months at the popular school which they attend, that they have strictly followed that course of instruction.

On the whole much attention has been given in Austria to the establishment and conduct of technical and industrial schools, and their present organization is generally approved. It met with honourable notice, and obtained two prizes of the first class from the Education Committee at the recent Paris Universal Exhibition, and the system in its present form is held to have been beneficially instrumental in promoting and extending manufactures and the general industry of Austria. But the system is not perfect—it is felt that the chain of instruction is not complete.

And although aspirations after the extension of local provincial autonomy have succeeded in the Reichsrath, in taking the organization and conduct of popular education out of the hands of the Central Government, I find a very general desire to see the management of schools guided by a uniform rule and system throughout the Empire, and under the supervision of the State. Yet it is to be confidently expected that of their own accord the various Provincial Diets will combine to establish in their own and in the general interest, an almost identical rule of organization—retaining the details of administration alone for the requirements of local custom and interests.

I enclose a numerous set of papers and works, reports by school authorities, and general reports of administration, regulations of various establishments, and other documents connected with this subject, to be annexed to this report.

A. G. G. BONAR.

Vienna, December 31*st*, 1867.

P.S.—I beg to draw particular attention to the accompanying work of Messrs. Beer and Hochegger—"Progress of the system of Education in the States of Europe," which is especially directed to a comparison of the schools and educational system in Austria, in Germany, and in Switzerland, and which stands in high estimation.

A. G. G. B.

I also add a number of the "Official Vienna Gazette," containing the whole framework of an "Imperial Technical Institution" founded at Brünn in Moravia, by Imperial Rescript of July, 8, 1867—with its statutes and regulations, and the complete organization of the establishment.

A. G. G. B.

No. 11.

Lord A. Loftus to Lord Stanley.

My Lord, *Berlin, December* 28, 1867.

I HAVE the honour to inclose to your Lordship, herewith, a report from Her Majesty's Consul at Dantzic on the Provincial Industrial School in that town.

In connection with this subject I may state that a new project of law has been lately submitted to the Prussian Parliament for regulating the primary schools, of which I shall shortly have the honour to forward your Lordship a copy in translation.

This question will probably give rise to much discussion in the Lower Prussian Chamber, and I shall not fail to transmit to your Lordship a detailed account of the opinions expressed in the Prussian Parliaments on this most important subject.

I have, &c.

(Signed) AUGUSTUS LOFTUS.

Inclosure 1 in No. 11.

Report on the Provincial Industrial School at Dantzic.

THE first attempt at technical education in Prussia dates as far back as the year 1824. The object of these schools at first was only to improve the education of the local handicraftsmen and of their apprentices, hence the original German denomination of these schools was "Handwerkerschule."

In the year 1850 a re-organization of this branch of public instruction took place in Prussia, and the zeal of the present Minister of Finance, formerly Minister of Commerce, Mr. von der Heyds, ably seconded by the efforts of some of the leading officials of his department, succeeded in giving to the system of industrial education adopted in Prussia a vitality which, whilst it has been highly beneficial to the classes for which it is intended, has of late deservedly attracted the attention of other countries.

The existing system, however, is far from being considered in Prussia as perfect, or as sufficient to meet the requirements of our time. If I am correctly informed it is the intention of the Government to introduce shortly a very considerable reform with a view to render it more complete; of these plans I may have occasion to speak later, but at present I am only desirous of giving a succinct account of the tuition in the Dantzic Industrial Provincial School, as it has existed up to the present time in connection with the general system of technical instruction in existence in the old Prussian dominions.

The basis of the entire system is of course the central college or academy at Berlin, established in 1820. This institution admits pupils

between 17 and 27 years of age, who having previously attended one of the provincial preparatory schools, devote three years to instruction in some of the following subjects:—

1. Technical knowledge.
2. Mechanics and machinery.
3. Chemistry.
4. Ship-building.

The 27 industrial schools existing in the provinces (frontiers of 1865), are all connected with this central college, which numbered, in 1866 476 pupils and 21 teachers.

Of the provincial schools that of Barmen, in the Rhenish provinces, was, I believe, the only one with seven classes, and therefore the largest, having 164 pupils, having been re-organized as a model school quite lately; some have only 20 pupils, as Mimsher in Westphalia, and Grandenz, in this province; this last school is, I hear, by no means in a flourishing state.

The average number of pupils in these preparatory schools amounts to about 60, and in so far, I believe, the Dantzic school is a fair specimen of its class.

It must be borne in mind, however, that in East and West Prussia there are no mines, and that the only manufactures existing are ship-building and machinery making, so that most of the pupils in these schools here wish to become foremen of the usual trades, such as stone and other masons, millers, carpenters, locksmiths, brewers, distillers, dyers, &c. A small proportion only attend this school here with a view to admittance for higher instruction in the college at Berlin.

There are no scholarships attached to the school at Dantzic, but proficiency gives pupils a right to compete for exhibitions at the Berlin college.

These schools in this province receive no support from private manufacturers, nor do they give the same opportunities of forming an opinion of the value of technical education in Prussia, as might be afforded in those existing in Silesia or on the Rhine, where they are stimulated by the contact with the mining and manufacturing interests of those flourishing districts.

The expenses of supporting these provincial preparatory schools are divided in equal shares between the State and the district, or, as in Dantzic, the city where it is situated. The municipality likewise supply the building, whilst the Government pays the first expenses of the establishment.

Those at Dantzic are estimated at £600, one-half of this for instruments, and the other half for a library and for drawing models.

The annual cost of the school at Dantzic is stated at 3,200 thalers (£480.)

All the pupils being day scholars it is impossible to estimate their expenses, as they live with their friends and board with them; the payment for tuition varies from 12 thalers (£1 16s.), which is the price at Dantzic, to 24 thalers annually.

The conditions of admission to the Dantzic Industrial School are as follows:

Age 14 at least.

Reading and writing German correctly.

Able to draw.

Knowledge of arithmetic and measuring lines.

There are two classes in this school; in the first there are 25, and 35 pupils in the second class.

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There are no females in the school.

There is no religious instruction given in the school, and the general supervision exercised is the same as in other Prussian day-schools.

The instruction given in the school includes German composition, algebra, trigonometry, physics, mineralogy in connection with manufactures, chemistry, the elements of mechanics and architecture, the construction of machines, drawing, and models.

At the end of the course there is an examination of the students, those that pass it satisfactorily enjoy the following advantages:

They are admitted to the central college at Berlin.

They have the privilege to serve one year in the army, instead of three, to which they would be liable otherwise, a privilege called "einjährizer Militaerdiense."

If admitted to certain trades in house-building, the *viva voce* part of the required examination is dispensed with in their case.

The teachers at the Dantzic school are only three, of whom one is likewise director of the school.

According to the projected reform it is intended to have five classes in these schools, to teach French and English in them, and to reserve for the last year of the course that part of the tuition and those studies which find special application in their future trades and professions.

No. 12.

Mr. Lumley to Lord Stanley—(*Received January* 24.)

My Lord, *Berne, January* 15, 1868.

I HAVE the honour to inclose herewith the copy of a note which I have received from the President of the Swiss Confederation, together with the voluminous documents that accompanied it, in reply to the request made by Admiral Harris on behalf of Her Majesty's Government for information respecting technical and industrial education, in Switzerland, in obedience to the instructions contained in your Lordship's despatch of August 10, 1867.

I have, &c.

(Signed) J. SAVILE LUMLEY.

Inclosure in No. 12.

The President of the Swiss Confederation to Mr. Lumley.

Berne, le 18 *Décembre*, 1867.

PAR sa note du 20 Août de cette année, M. le Ministre de Sa Majesté Britannique près la Confédération Suisse a adressé au Conseil Fédéral une liste de questions relatives à l'enseignement technique et industriel dans les pays étrangers, en le priant d'y répondre en ce qui concerne la Suisse.

On exprime en même temps le désir d'obtenir communication de rapports et d'autres publications y relatives.

Le Conseil Fédéral a l'honneur de transmettre à son Excellence la Loi Fédérale du 7 Février 1854, concernant la création de l'Ecole

Polytechnique Fédérale, le Règlement du 28 Février 1866, et le dernier Rapport Annuel, ainsi que le Programme pour le semestre d'hiver 1867—1868, et un exemplaire du Compte d'Etat de la Confédération pour 1866.

Le Conseil Fédéral croit que le Gouvernement Royal pourra par ces documents acquérir une notion suffisante de l'organisation et des frais de l'Ecole Polytechnique Fédérale.

Il existe à Lausanne un établissement privé subventionné par le Gouvernement et la commune de Lausanne sous le nom d'Ecole Spéciale de la Suisse Française pour l'Industrie, les Travaux Publics et les Constructions Civiles, fondée en 1853. Ci-joint le programme triennal détaillé de cet établissement.

Ainsi qu'il ressort du 2e alinéa de la première question, l'attention du Gouvernement Royal paraît tout particulièrement être dirigée sur des établissements d'éducation qui sont destinés à l'avancement d'une branche d'industrie.

Il n'existe pas en Suisse d'établissements publics de cette espèce, mais quelques instituts privés, les uns avec subvention de l'Etat, les autres sans subvention.

C'est ainsi qu'il y a une Ecole d'Horlogerie à St. Imier, Canton de Berne, qui a été fondée en 1865 et qui a reçu en 1866 une subvention de l'Etat de frs. 1,000.

A Brienz, Canton de Berne, une Ecole de Dessin a été fondée par des particuliers pour l'avancement de la sculpture sur bois.

M. le Banquier Ulrich Zellweger à Frogeu, Canton d'Appenzell, Rhodes Extérieures, a aussi organisé une Ecole de Tissage pour l'avancement de l'industrie cotonnière. Ni l'Etat ni la Commune n'accorde de subvention à cette école.

Ce sont là les seuls établissements de cette espèce existant en Suisse, et le Conseil Fédéral n'est malheureusement pas dans le cas de pouvoir faire des communications ultérieures sur ces entreprises privées.

Des fabricants de soie du Canton de Zurich ont le projet d'ériger une grande école de tissage de soie, à l'établissement de laquelle on voudrait faire participer l'Etat.

Si, au reste, la Suisse possède peu d'établissements spéciaux en faveur de quelques industries, l'on ne doit pas perdre de vue que partout en Suisse on cherche à écarter par une bonne *instruction primaire* les principaux obstacles à l'avancement de l'ouvrier.

Aux écoles primaires obligatoires, à la seule exception du Canton de Genève, viennent se joindre ici les établissements suivants, dont la fréquentation est facultative, savoir:

a. Les écoles d'artisans et d'industriels ou écoles du Dimanche fondées dans la plupart des cantons sous différents noms, dans lesquelles on inculque à ceux qui les fréquentent, les connaissances les plus nécessaires à la classe des artisans, pour autant qu'elles n'aient pas déjà été acquises à l'école primaire, dans l'arithmétique, la tenue de livres, la correspondance, le dessin, &c. On ne paie ordinairement pas d'écolage dans ces établissements; par contre, les écoliers doivent acheter eux-mêmes les matériaux pour l'instruction.

Ici et là ces écoles sont entretenues par des subventions volontaires: dans d'autres endroits la commune ou l'Etat, ou quelquefois tous les deux, donnent une subvention.

b. Les écoles secondaires, dans lesquelles l'instruction reçue aux écoles primaires est continuée,—une langue moderne au moins, outre la langue maternelle, l'histoire naturelle et les mathématiques sont enseignées. Ces établissements sont répandus partout dans le pays.

L'écolage est modique et la fréquentation nombreuse. Le besoin d'une instruction plus étendue qu'offrent les écoles secondaires devient toujours plus général, et l'Etat et les communes font leur possible pour faciliter l'utilisation de ces établissements.

c. Les écoles industrielles cantonales, qui continuent l'instruction particulièrement nécessaire aux industriels, jusqu'à la 18e ou 19e année, tandis que les écoles secondaires ne vont, dans la règle, pas au-delà de la 15e année. Elles procurent ordinairement l'étude des langues Allemande, Française, Italienne et Anglaise, et des connaissances étendues dans les mathématiques, la physique, &c. Quoiqu'établissements tout-à-fait indépendants, elles servent en même temps d'écoles préparatoires pour l'Ecole Polytechnique.

Le Conseil Fédéral envoie également à M. John Savile Lumley les lois, règlements, programmes et rapports qu'il a reçus de neuf grands cantons (Zurich, Berne, St. Gall, Argovie, Thurgovie, Tessin, Vaud, Neuchâtel et Genève), sur les établissements d'éducation dont il est question dans cette note, et il y joint deux numéros du journal intitulé "Zeitschrift für Schweizerische Statistik," qui renferment des extraits des rapports de tous les cantons sur l'éducation et les comptes d'Etat.

Pensant par ces communications avoir satisfait, dans la mesure du possible, à la demande formulée par la Légation Royale dans sa note du 20 Août dernier, le Conseil Fédéral désire qu'elles puissent être de quelque utilité au Gouvernement de Sa Majesté Britannique, et il saisit, &c.

Au nom du Conseil Fédéral,
Le Vice-Président:
(Signé) DUBS.
Le Chancelier de la Confédération:
(Signé) SCHIESS.

(Translation.) *Berne, December* 18, 1867.

HER Britannic Majesty's Minister accredited to the Swiss Confederation, in his note of the 20th of August of the present year, asked the Federal Council a series of questions touching technical and industrial education in foreign countries, and requested that he might be furnished with the required information, in so far as Switzerland was concerned. He further applied for reports and other publications connected with the subject.

The Federal Council has the honour to transmit to his Excellency copy of the Federal Law of the 7th February, 1854, concerning the first establishment of the Federal Polytechnic School, of the regulations issued on the 28th of February, 1866, of the last annual report, of the prospectus for the winter half-year of 1867–68, and a copy of the State report of the Confederation for the year 1866.

The Federal Council conceives that the British Government will be able from these documents to acquire full information respecting the organization and cost of the Federal Polytechnic School.

At Lausanne there is a private establishment, to the support of which both Government and the municipality of Lausanne contribute, called the Training School of French Switzerland for trade, public works, and private buildings ("constructions civiles"), founded in 1853. The detailed triennial report relating to this establishment is annexed.

It appears from the second paragraph of the first question, that the

attention of the British Government is especially directed towards those educational establishments which have for their object the furtherance of one branch of industry only.

No public institutions of this nature exist in Switzerland, but there are several private ones; some of these are supported by Government grants, whilst others are not so supported.

Thus there is a watchmakers' school at St. Imier, in the canton of Berne, founded in 1865, which, in 1866, received a Government contribution of 1,000 francs (or about 40*l.*).

At Brienz, in the canton of Berne, a school of drawing was founded by private individuals for the improvement of wood carving.

Mr. Ulrich Zellweger, a banker of Frogen, in the canton of Appenzell, *Rhodes Extérieure*, also established a school of weavers for the improvement of cotton manufacture. Neither the State nor the municipality contribute towards the support of this school.

The above are the only establishments of this nature in Switzerland, and the Federal Council is unfortunately not in a position to furnish further information respecting private undertakings.

Some silk manufacturers of the canton of Zurich, purpose founding a large school for silk weaving, and have applied for a Government grant towards this object. Although Switzerland possesses few institutions specially dedicated to the furtherance of one branch of industry, the fact must not be overlooked that, throughout the country, attempts are being made to remove the main hindrances to the improvement of the working classes, by giving them good elementary education.

In addition to the elementary schools, attendance at which is compulsory, everywhere but in the canton of Geneva, there are the following establishments, attendance at which is optional, namely:—

A. The artizan's and workmen's, or Sunday schools, founded in most of the cantons under different designations. In these the knowledge likely to prove most useful to the class of artizans is taught, provided they have not already acquired it at the elementary schools, in arithmetic, bookkeeping, letter-writing, drawing, &c.

Schooling is not usually paid for in these institutions, but on the other hand the scholars are bound themselves to buy such things as may be requisite for their instruction.

In some places these schools are supported by voluntary contributions, but in others by grants from the municipality or the State, or sometimes from both together.

B. The higher schools ("Ecoles Secondaires"), in which the instruction is received in the elementary schools is continued, and at least one modern language besides the mother tongue is taught, as well as natural history and mathematics.

These establisments are scattered throughout the country; the schooling is cheap and the attendance full. The demand for the more extended instruction which these higher schools afford is continually on the increase, and both Government and the municipal authorities do all they can to encourage attendance at those establishments.

C. The cantonal industrial schools, which continue the instruction specially required by commercial men to the age of 18 or 19, whilst the higher schools ("Ecoles Secondaires"), do not, as a rule, go beyond the age of 15. German, French, Italian, and English are usually taught there, as well as the higher branches of mathematics, physics, &c. Although these establishments are wholly independent, they act at the same time as preparatory schools for the Polytechnic School.

The Federal Council further forwards to Mr. John Savile Lumley the laws, regulations, prospectuses, and reports which they have received from the nine larger cantons (Zurich, Berne, St. Gall, Argovie,

Thurgovie, Tessin, Vaud, Neuchatel, and Geneva), which treat of the establishments alluded to in their present note, and as well as two numbers of the newspaper called "Zeitschrift für Schweizeretche Statistik," which contain extracts of the reports on State Education and Accounts.

The Federal Council believe that the communication of the above documents will, as far as may be possible, furnish the information requested by the British Legation of the 20th of August last; they trust that that information may prove of use to Her Britannic Majesty's Government, and avail themselves of this occasion to renew to His Excellency the assurance of their high consideration.

In the name of the Federal Council,

The Vice-President,

(Signed) DUBS.

The Chancellor of the Confederation,

(Signed) SCHIESS.

No. 13.

Sir. H. Howard to Lord Stanley.—(Received December 6.)

My Lord, *Munich, November 30, 1867.*

I HAVE had the honour to transmit two copies, as presented to Her Majesty's Government by Prince Hohenlohe, of the project of law for the reorganization of the national schools in Bavaria recently submitted by the Government to the Chamber of Deputies.

One of the features of this Bill is to withdraw the country schools from the more immediate control of the clergy by the establishment of local commissioners for their supervision, of which, however, the parish clergyman will be a member. The Roman Catholic prelates previous to the presentation of the Bill to the Chamber, addressed a protest against it to the King, on the plea that it was calculated to deprive the system of education in Bavaria of its Christian character; but, his Majesty having referred this protest to his Ministry, the prelates received an answer from the Minister for Ecclesiastical Affairs in refutation of their charges. It is stated that, since the presentation of the Bill, they have renewed their protest against it.

The Protestant hierarchy have, on the other hand, abstained from any remonstrances against the Bill, although in Protestant communities, the position of their clergy will be equally affected by it.

I should observe that the provision of the existing laws, according to which the religious instruction is given in the national schools by the clergymen of the different recognized religions respectively, is upheld in the new project of law.

The Bill has been referred by the Chamber of Deputies to a committee, who have named as their reporter a Protestant clergyman, which affords a satisfactory proof, were any wanted, of the liberal spirit prevailing in a country, of which the majority of the population are Roman Catholics. As the Bill is likely to be variously amended during its passage through the Chambers, I will reserve a further report upon it, until it has passed both Houses.

I have, &c.

(Signed) HENRY F. HOWARD.

No. 14.

Lord A. Loftus to Lord Stanley.—(*Received January* 20.)

My Lord, *Berlin, January* 18, 1868.

I HAVE the honour to inclose to your Lordship herewith in original, with a translation by Mr. Lascelles, a draft of law which has been submitted by the Prussian Government to the House of Peers for regulating primary instruction and the national schools in Prussia.

In 1845 a Ministerial regulation was published for the primary or normal schools in Prussia, which established two principles, viz.:—

1st. Compulsory education at the expense of the commune.

2nd. A minimum of salary for the masters.

In 1848 the question of popular education was brought under the notice of the Parliament of that day—but without giving rise to any effective measure. In 1850 a general law was projected for the whole monarchy—but difficulties and delays intervened, and no definite measure was passed. Again in 1859 M. Bethman and Hollweg, then Minster of Public Instruction, made a fresh attempt to introduce a general law on the same basis, but without success. The Chamber of Deputies then expressed a wish for the introduction of a law to regularize the primary schools separately, and as a preliminary step, without awaiting the introduction of a general law for the whole monarchy.

The present draft of law is based on this wish. It does not extend itself to the whole question of public education in all its branches—but merely refers to primary or elementary education.

This law is divided into four sections, namely:—

1st. It establishes or confirms the principle of compulsory education, viewing it as the necessary foundation of primary instruction.

2nd. It establishes the extent and aim of the instruction given—the class of public schools—and the necessity of taking into account in the internal organization of the schools, the circumstances of the locality, population and religion.

3rd. It treats of the maintenance of scholastic institutions, and finally, and 4thly, it refers to some general regulations.

In the elementary schools religion is considered as the basis of instruction in conformity with the religious creed of the pupil, and consequently every school bears a religious character. The religion of the master must be in conformity with that of the majority of the children, where the master is not of the same creed with the child, the parents of the child may decide as to the religious instruction which the child has to receive.

This Bill will doubtless give rise to an interesting debate in both Houses of the Prussian Legislature, and I shall not fail to report to your Lordship the various opinions expressed in the course of its discussion.

I have, &c.

(Signed) AUGUSTUS LOFTUS.

Inclosure in No. 14.

Staats-Anzeiger, December 17, 1867.

I. *Universal School Obligations.*

§ 1. Every child from its sixth to its fourteenth year, both complete, must receive regular instruction in religion and in the sciences and acquirements necessary for civil life.

This instruction must begin in the public popular schools. The parents, guardians, or masters are bound to enforce the regular attendance of the children, unless they provide otherwise for their instruction. Should this be the case, it must be proved to the satisfaction of the School Inspectors that the results of such instruction correspond to the requirements of the public elementary schools.

II. *Regulations for Public Schools (Elementary Schools, Civil Schools).*

§ 2. The teaching in elementary schools embraces—

1. Instruction in religion, including Bible history.

2. Instruction in the proper manner of speaking and writing the German language. In cases in which German is not the mother tongue of the child, regard will be had in the course of education to the mother tongue, according to the necessities of the case.

3. Instruction in history, geography, and natural history, as contained in the "School Reader" (vorkschullereluch).

4. Exercises in arithmetic, mensuration, and drawing, necessary for civil life.

5. Instruction in singing.

Besides this the boys are to be taught regular bodily exercises, and where it is necessary, and the proper arrangements can be made, the girls are to be instructed in female handiwork.

§ 3. In every elementary school composed of several classes these studies are to be arranged in accordance with a programme of work drawn up in proportion to each class.

Every elementary school composed of several classes shall be under the direction of a head master.

§ 4. In so far as those interested are able, civil schools (Bürgerschulen) are to be instituted.

In the civil schools the subjects prescribed for the elementary schools are to be taught according to a more extended programme, in proportion to the classes. In this programme, the German language, history, geography, and natural history form the obligatory studies. The instruction in drawing, arithmetic, and geometry will have especial regard to the necessities of a commercial life. Instruction in foreign languages may also be given.

Every civil school shall be under the direction of a rector.

§ 5. To the national schools may be united, upon the wish of those bound to maintain them, and with the consent of the Government establishments for taking care of, bringing up and instructing children who are under the regulation age, schools for charity (nachhülfe) and preparatory schools, orphan houses, asylums, and similar establishments, provided sufficient provision is made for the national schools.

§ 6. The same applies to such public schools where a particular creed is taught. The Minister of Instruction is empowered to withdraw from such a school the rights of a public school, if in three con-

secutive years the number of children belonging to its creed amount to less than twenty.

§ 7. If the creed of a school is not defined, the vacancies in elementary schools of one class can only be filled up by teachers belonging to the religion to which, at the time of the appointment, the majority of the school children belong.

In the case of public schools of several classes, two teachers of different religions may be appointed to different classes in proportion to the religions in the school district.

§ 8. Newly established public national schools must, as a rule, be evangelical or Catholic.

Where there are a sufficient number of Jewish children, Jewish elementary schools may be established with the rights of national schools.

§ 9. No child is to be refused admittance to a public school on account of difference of religion.

§ 10. Children which belong to another religion than that of the teacher, are not to be forced to attend the religious instruction of the teacher against the wish of the father or guardians.

§ 11. If there are more than fifteen children in a school who belong to a different religion than that of the teacher, all possible steps must be taken that these children may receive proper instruction from a neighbouring teacher or priest belonging to their own religion.

§ 12. With regard to the school duties of the children, the Gort will have to make further regulations, in accordance with the conditions of § 1 of this law, relative to the dispensations to be granted to sick and delicate children and other exceptional cases, and to arrange the yearly or half-yearly terms for the reception or discharge of the scholars.

The school duties of children received into public schools cease at the end of the regular term, after they have obtained the age of fourteen.

§ 13. On leaving school each child shall receive from the district school inspector and from the teacher a certificate gratis, stating in how far the aim of the national schools has been attained.

§ 14. In the national schools not more than thirty lessons, and not less than twenty-six are to be given per week. A further diminution of the weekly number of lessons can only take place with the consent of the Government.

§ 15. As a rule, no teacher shall instruct more than eighty children at the same time.

In cases of schools where the number of children is from 80 to 120, the Government having regard to the means of those who are bound to support the school, may determine that one teacher shall instruct the children in two separate divisions and at different hours. In such half-day schools each division must receive at least three hours' instruction.

§ 16. If children who have completed their twelfth year, and have received a certificate from the district school inspector and the teacher that they possess knowledge of reading, writing, arithmetic, and religion in proportion to their age, receive wages for service or permanent work, the period of instruction may be in such cases reduced. As a rule, however, the period can only be reduced to three hours a day, and that only when special schools (*e.g.*, factory schools) are instituted for such children, or when the instruction in the national schools is arranged in such a manner that they may receive instruction in the necessary studies for three hours a day without detriment to the others.

In all other cases these children are bound to attend school regularly.

§ 17. If any one prevents his own children, or those under his charge or in his service, from attending the national schools in accordance with the provisions of this law, he may be compelled to it by the police. The penalties for this offence are—1st. A fine to the amount of 10 silver groschen (1*s.*) for neglecting school, or proportionate imprisonment. 2nd. Taking the children to school by force, and levying a tax to be determined by the Government.

The Government are empowered to issue more detailed regulations with regard to the observation of this provision.

§ 18. The Governments, after examination of those interested, and regard being had to their necessities and capabilities, will make arrangements for the formation and establishment of new national schools, the alterations in existing schools, and the abolishment of those which are not necessary, the limits of the school circles, and the appointment of children to particular schools.

III. The maintenance of public schools.

§ 19. The maintenance of the public schools in existence at the time of the publication of this law is to be provided for according to the law as at present in force, until a further regulation for such maintenance is made.

§ 20. A regulation in accordance with the provisions of this law may be made: 1st, if those persons who are legally bound to provide for the maintenance of a public school, apply for it, and if the applicants contribute more than half of the regular school charges; or, 2nd, if the contributions of those bound to maintain the school are no longer sufficient, and they decline to make up the deficiency; or, 3rdly, if the Government, after examination of the representation of the district, consider that a new regulation is necessary in the interest of the national school system.

§ 21. This regulation is to be made in accordance with the following principles:—1. Endowments, land, and other property shall continue in the possession of the existing schools, as well as any obligations which are based on a special title. In the province of Prussia the schools will retain the income, which will be paid out of the fiscal revenue, and which is granted to them instead of a piece of land. This income may be redeemed, upon the proposal of the fiscal authority, by the payment of 25 times the amount. 2nd. Beyond this, the means necessary for the support of public national schools are to be defrayed by the school circle. 3rd. Within the school district, as a rule, the parishes and independent estates must contribute to the school charges.

§ 22. The costs which are charged to a parish on account of the establishment, maintenance, or enlargement of public national schools, will be collected, together with the charges necessary for covering other necessities of the parish.

§ 23. Should several parishes be, either completely or in part, united together, or with independent estates, in one school district, the costs of such a district will be divided in proportion to the *number of the inhabitants*, and the share to be paid by the parishes, will be collected in each parish separately, according to the provisions of § 22. The calculation of the number of inhabitants will be made, according to the results of the last general census.

§ 24. In the same manner independent estates, not belonging to any parish, but which are united together, or with parishes or portions of parishes, in one school district, must contribute to the charges of the school, in proportion to the number of inhabitants on the estate.

In every independent estate, the proprietor must make up the deficiency in the contributions of the inhabitants of the same, but the right is reserved to him of having recourse to those bound to contribute.

§ 25. In cases where the maintenance of public national schools has been, up to the present time, dependent upon particular school parishes, and the continuance of such an arrangement is desired by the parties interested, and is recognized as excessively appropriate, it may be left as it is in case of a new regulation for the maintenance of schools.

In this case all the inhabitants and landowners, in the same way as a particular school parish, must make up the school charges, which would fall upon the district of the school parish.

Should several public national schools be comprised entirely or in part within one district, every inhabitant of the same is only bound to support that school which is in accordance with the religion of his children.

§ 26. The division of school charges takes place in the case provided for in § 25, and also when parishes and independent estates join together for the maintenance of the school, likewise according to the number of inhabitants within the special school district in proportion to the taxes which may be levied in the district of the school parish upon land, buildings, and class tax, and classified income tax in the following proportion.

Pieces of land, lying within the district of the school parish will, even if they belong to a judicial person, or if the owners should not reside within the district, be liable to school charges, in proportion to the land and building tax levied upon them.

The tax upon woodlands is only to be calculated as one-third of that levied on cultivated land.

The following are exempted from the charges of the school:—*a*. Possessions described under letters *c*, *d*, *e*, in § 4 of the law relating to land tax, of May 21, 1861 (Geretz. Samlung for 1861, page 253; *b*, buildings described under Nos. 2 to 8, in § 3 of the law relating to building tax, of May 21, 1861 (Geretz. Sambing for 1861, page 317).

§ 27. Those possessions which are described under letters *a* and *b*, in § 4 of the law relating to land tax, which are exempted from land tax, will be rated for contributions to the school charges, in proportion to the percentage of their net proceeds, as shown by the land tax books, in compliance with § 3; *a*, *a o* in conjunction with §§ 19 and 28 of the law of February 8, 1867 (Geretz Samlung for 1867, page 185).

In those provinces in which the law relating to land tax (Geretz Samlung for 1861, page 253) has not yet come into operation, the Governor, or the properly appointed authority will, as long as such is the case, determine in what proportion the land tax is to be levied upon property in order to obtain a proper division of the contributions towards the school charges.

Buildings which, according to the provisions under No. 1, in § 3 of the law relating to building tax, of May 21, 1861 (Geretz Samlung for 1861, page 317), are free from building (house) tax, will be called upon to contribute to the school charges in a proportion equal to buildings which are subjected to the tax.

§ 28. The privileges granted by law to servants of the State and to their heirs, with reference to the payment of the parish charges, have equal force with reference to the payment of school charges.

§ 29. The principles laid down in §§ 26-28 are also applicable to

the division of school charges in any provincial parish where these do not exist, any regular plan for the equal division of all the charges of the parish. The same applies to the subdivision of the rate of charges falling upon an independent estate.

§ 30. Schools which are not established and maintained by persons legally bound to do so in order to satisfy the general inquiries, but which have been founded upon the proposal of beneficent institutions, or by means of the contributions of certain establishments, corporations, or classes of inhabitants, may, if they fulfil the requirements of public national schools, be recognised as such, and have the rights and duties of public national schools, but still the foregoing regulations relative to the maintenance of the latter do not apply to them unless they are fully enrolled in the organization of the general national schools.

§ 31. If it should be necessary in the interest of the public national school system to make alterations in the extent of school parishes, or in the limits of school districts, and if in consequence it should be necessary to make arrangements with or grant compensation to the the parties interested, it must be done by means of the administration, with a due regard to private claims.

If in such a case an agreement should be come to by the parties interested, the assent of the Government to it will suffice, in other cases the Minister of Instruction will have to decide.

§ 32. The obligations for the establishment, maintenance, and extension of public national schools extends to the procuring of all the things which are necessary to the perfect attainment of their object.

More especially must an income be secured to the teachers corresponding to their education and to local circumstances.

§ 33. The teachers in elementary schools in towns of less than 10,000 inhabitants must receive a dwelling free of expense, or a corresponding compensation for house rent, besides an income of at least 200 to 250 thalers. Rectors in civil schools must receive, besides their dwelling, an income of not less than 400 to 600 thalers.

In towns of more than 10,000 inhabitants the foregoing regulations relative to the minimum of income may be raised to double the amount, according to the necessities of the case.

In schools composed of several classes, the salaries of the teachers are to be raised in regular gradations, in such a manner that the average amount of all the salaries must exceed the minimum by one-third.

§ 34. Teachers in the country shall receive, 1st, free lodging, &c., and the necessary fuel for kitchen and house, or, if such cannot be granted in kind, a corresponding equivalent in money; 2nd, so much land, natural products, and money as may be necessary for the maintenance of their position.

The amount of these salaries, and the principles upon which grants of land and natural products are to be made, must be settled in each province by the Provincial Landstag, subject to the approval of the Government of the State. The minimum allowances for the head masters of schools composed of several classes, for teachers acting alone, and for second and lower masters, must be specially arranged; in this category a wider graduation of the minimum allowances may be made according to the different parts of the province, or other important circumstances.

§ 35. Within these limits (§§ 33, 34) the Governments must settle, after examination of those bound to support the school, and regard being had to their fortunes, and also to the size and clearness of the place where the school is, the minimum allowances of the teachers.

§ 36. The reduction of the income of a mastership endowed above

the minimum rate, can only take place with the consent of the Minister of Instruction.

Such must also be the case in places where the minimum allowances exceed those of § 33.

§ 37. If the school is joined to a church property, the value of the fixed receipts of the latter, and the net proceeds of the land belonging to it, must be taken into account in settling the minimum income.

In case of a separation, the income of the school must be raised by those bound to support it to the amount agreed upon.

§ 38. Those who are bound to maintain the teachers must provide means for the conveyance of their families and effects for the distance of 10 miles from the school, or grant a compensation not exceeding 20 thalers. The amount of the same will be fixed by the Government when an amicable arrangement is not come to. Reimbursement of the expenses of the journey is not allowed.

§ 39. The arrangements between a departing teacher, or the heirs of a deceased teacher, and a newly arriving teacher, will be regulated according to the time of service of the departing or deceased teacher during the last financial year, which must be reckoned from the 1st of October to the last of September.

In cases of dispute it will be settled by an order of the Government, and with reservation of the right of going to law.

§ 40. After the death of a teacher, his widow and children remain in possession of the dwelling, and of the income of the post, for two months after the conclusion of the month in which he died, but are bound, if required, to provide shelter for his successor in so far as the dwelling is large enough, and to look after the cleansing and heating of the school in so far as this was the duty of the teacher.

Those bound to support the school must bear the expenses of the succession.

IV. *Final Provisions.*

§ 41. An appeal may be made to the Minister of Instruction against any measures issued by the local governments upon the principles of this law, within a period of four weeks.

In cases of haste this period may be reduced to eight days.

The mode of procedure is in accordance with the law of May 22nd, 1861, § 15, Gesetz Sammlung, page 244.

§ 42. All provisions opposed to the provisions of this law hereby cease to exist, whether they are contained in general or provincial laws and ordinances, or in especial laws.

The Minister of Instruction is charged with the execution of this law, in conjunction with the Minister of the Interior.*

No. 15.

Mr. Lumley to Lord Stanley.—(Received January 24.)

My Lord, *Berne, January* 19, 1868.

In obedience to the instructions contained in your Lordship's despatch to Admiral Harris of July 17, 1867, Mr. Rumbold has addressed to me the enclosed statement with regard to the condition of technical and industrial instruction in Switzerland.

* See also Appendix, page 340.

Taken in connection with the voluminous papers contained in the note addressed to me by the Federal Council on the 18th ultimo, and which accompanied *my despatch of the 15th instant, as well as* with Mr. Rumbold's report on the general question of popular education in Switzerland, I conceive that Her Majesty's Government is now fully placed in possession of all the information that can be obtained on these questions.

I have, &c.,
(Signed) J. SAVILE LUMLEY.

Inclosure 1 in No. 15.

Mr. Rumbold to Mr. Lumley.

Sir, *Berne, January* 15, 1868.

THE Federal Council, in their note of the 18th ultimo addressed to you, appear to me to have given as complete an answer as possible, respecting this country, to the series of questions relative to technical and industrial education, inclosed in Lord Stanley's despatch to Admiral Harris of July 17, 1867. In deference, however, to the instruction contained in his Lordship's despatch, I have the honour to address you on the same subject, but without entertaining the hope of throwing much additional light thereon.

Technical instruction, strictly so called, for the working classes is little known, and still less believed in, in Switzerland, and, without much exaggeration, as pithy and conclusive a chapter might be written respecting it as the celebrated one on "Snakes in Norway."

What is believed in, and what is most concientiously carried out in Switzerland, is thorough general education, education for the masses, reaching down to, and purifying, as it were, the lowest depths of society, and not, as in some countries, leaving them to form in their stagnation so unsound and impure a foundation as to cause the whole superstructure to be rotten and insecure. To raise each individual member of the community up to a given standard, and, having thus far developed him, to leave him to work out the rest by his own faculties, and by the help of the natural gifts and aptitudes Providence may have bestowed upon him, such seems to be the simple sum total of the Swiss philosophy of instruction for the people, and it leaves little room for any special or technical education, properly so called. If, as appears to be so much dreaded in England, the foreign handicraftsman has, indeed, of late, been proving himself superior to his British comrade, it is, says the Swiss, not because he is taught, as it were, in a given direction and with a special object, but because he has been made an educated being from the first. Having of late conversed much with persons of this country on educational questions, I cannot conceal from myself that the great stress at present laid in England on the paramount importance of providing technical instruction for the working classes has been viewed with some surprise as not being in logical accordance with the real wants of those classes. Criticisms, more or less invidious, are passed upon this anxiety to furnish the skilled workman with special knowledge, directed to the sole object of making his labour more productive, and it is asked whether it be not necessary first to raise the intellectual level of the entire class to which he belongs, and then to single out of it those

individuals showing special aptitude for further development. In alluding thus to foreign views upon this question, I am, however, perhaps overstepping the strict limits within which a report like the present one is properly confined; and I will only add, in explanation, that the impression above conveyed is in part perhaps due to the somewhat "naïf" zeal with which certain inquiries in to the causes of the excellence of Swiss manufactures were pursued in this country some few months ago.

The Federal Government, in their note above referred to, mention the following educational establishments as approaching in character to the industrial colleges or schools respecting which information is sought:—

1st. The Federal Polytechnic School at Zürich, founded in 1854, and which may be fairly termed a technical university.

2nd. A private school at Lausanne with the title of "Ecole Spéciale de la Suisse Française pour l'Industrie, les Travaux Publics et les Constructions Civiles," founded in 1853.

3rd. A school for watchmakers at St. Imier, in the canton of Berne, founded in 1865.

4th. A school of design for the promotion of carving in wood, founded by private individuals at Brienz.

5th. A private school for weavers ("Ecole de Tissage," or "Webschule") at Trogen, in the canton of Appenzell Ausser Rhoden.

Mention is further made of a school on a large scale for silk weavers which it is intended to found at Zürich, and in favour of which the "Grand Conseil" of the canton has lately been petitioned.

The Polytechnic School at Zürich (the only Federal educational establishment in the country) is divided into seven schools or sections, which afford theoretical and practical instruction in—

1. Architecture and the art of building.
2. Bridge and road making, railway and hydraulic engineering (ecole du gènie civil).
3. Mechanics applied to industry (ecole de mécanique).
4. Chemistry applied to industry (ecole de chemie).
5. Management of woods and forests (ecole forestière).

In sections six and seven (Ecole Normale des Sciences, mathématiques, et physiques, and ecole des belles-lettres et des sciences morales et politiques) modern languages, mathematics, natural sciences, political history, and the history of art, Swiss jurisprudence, and political economy are taught, as far as they are necessary, as a complement to the technical instruction imparted in the other divisions. The course of studies at this school is the continuation and development of the studies pursued at most of the cantonal and industrial schools.

The regular scholars, who must have completed their sixteenth year, pay 100 francs a-year, and an immatriculation fee of five francs. A few more fees are charged for special lectures. "Auditeurs," or listeners, are also admitted on payment of five francs every half year for each weekly lesson of one hour. There are exceptional regulations in favour of poor pupils who evince special merit or knowledge. Diplomas are granted by the college conferring the degree of architect, civil engineer, engineer in mechanics, chemist and apothecary, "forestier," and teacher in mathematical and physical sciences. In the school year 1866-67 the college was attended by 551 regular pupils, of whom 243 were Swiss, and 308 foreigners. Of the latter the greatest number were Austrians (38), Hungarians (43), Poles and Lithuanians (31), Bohemians (26), and Russians (25). There were

also two pupils who were natives of the United Kingdom, and two natives of the United States. 130 "auditeurs," the majority of whom were students at the Zürich "Hochschule," or University, likewise attended the lectures.

The "Ecole Spéciale pour l'Industrie" at Lausanne is, on a smaller scale, the counterpart of the Federal Polytechnic School at Zurich. It was founded in 1853, a year before the creation of the latter institution, but is accused of being the work of French exclusiveness, and by attracting the Swiss of the French cantons of defeating in part the Panhelvetic (if I may be permitted the word) intentions of the founders of the "Polytechnic," where the instruction is given in the three national languages. The establishment is in part supported by the Vaudois Government, and by the commune of Lausanne. The latter has endowed 2 scholarships (worth together 1,000 francs) for the poorer "bourgeois" of the city; a free scholarship is likewise given by the school, and with the other two, is open to competition. This school answers to the French "Ecoles des Ponts et Chaussées," and is specially intended to form building, mechanical, and chemical engineers (ingénieurs constructeurs, ingénieurs, mécaniciens et ingénieurs chimistes) and architects. The course of study comprises three years, and the cost of teaching is 500 francs a year per pupil.

The "Webschule" at Trogen is an establishment founded entirely at his own cost by M. Zellweger, a banker of Appenzell, who has likewise established a model alpine dairy or cheesemaking farm (sennhütte), and is a very liberal patron of the poorer classes in his canton.

There are further two "Ecoles Industrielles" at Chaux de Fonds and Locle, in the canton of Neuchâtel, but these are both branches of the "Ecole Cantonale." There is also a "Collège Industriel et Commercial" at Geneva.

Besides these, the following cantons: Zürich, Berne, Zug, Lucerne, Fribourg, Soleure, Bâle Ville, Schaffhausen, St. Gall, Grisons, Appenzell Ausser Rhoden, Aargau, Thurgau, and Vaud, have cantonal schools, those of most importance being divided into two sections, the first, and most ancient, of which is on the pattern of the French "college" or "lycée," and in the main gives the old time-honoured classical education, whilst the second, of more recent growth, under names varying in different cantons, as "Real Schule" at Berne, and "Industrie Schule" at Zürich, furnishes a more extensive and modern course of studies, comprising living languages (English and Italian), the natural sciences, higher mathematics, and drawing. Some of these institutions—those at Zug and at Trogen (in Appenzell), for instance—are said to be well deserving of notice, both for their excellence and on account of the liberal manner in which they are supported by two of the smallest States of the Confederation, the cantonal school at Trogen further enjoying the distinction of being frequented by pupils from abroad.

Up to a certain point the "Ecoles d'Artisans" and Sunday schools already mentioned in my report of December 26, 1867, provide the technical instruction respecting which information is desired; in a very limited, though highly practical, sense, however. No mechanical or artistic knowledge is imparted to them, except perhaps in the shape of geometrical drawing; but the pupils are trained in simple matters, such as bookkeeping, business letter writing, &c., certain to be of great use to them in the pursuit of any trade, or in any industrial occupation.

At the risk of appearing tedious, I must again repeat that the pride of the Swiss people is centred in their scheme of popular educa-

tion in general, and not in any technical development of the same; and for information on the subject, I venture to refer you once more to my report of the 26th ultimo.

I will, in conclusion, take this opportunity of expressing my best acknowledgments to several members of the Federal Administration, and especially to the Federal Statistical Department, in the persons of its head master, Max Wirth, and of his chief assistant, M. Stoessel, for the very kind assistance they have afforded me in these and other inquiries respecting Switzerland. Sadly imperfect as I feel their result to be, I may perhaps be permitted to add in self-defence that it is so, in part, on account of the difficulty and labour of writing about a country with numerous divisions and corresponding varieties of legislation.

I have, &c.
(Signed) HORACE RUMBOLD.

No. 16.

Mr. Lumley to Lord Stanley.—(Received January 24.)

My Lord, *Berne, January 19, 1868.*

I HAVE the honour to transmit herewith to your Lordship Mr. Rumbold's half-yearly report.

The subject chosen by Mr. Rumbold, "Popular Education in Switzerland," is one to which public attention in England is particularly attracted at the present moment.

This report has been a work of considerable labour and difficulty; and the able and exhaustive manner in which Mr. Rumbold has treated the question, renders it a valuable addition to the information of this nature already published.

I have, &c.
(Signed) J. SAVILE LUMLEY.

Inclosure in No. 16.

Report by Mr. Rumbold on Popular Education in Switzerland.

Berne, December 26, 1867.

I OFFER no apology for selecting popular education in Switzerland as the subject of this report. The Swiss people, whilst proud of democratic institutions which may possibly be well suited to the genius and requirements of Swiss society, are wisely convinced that their only sound and lasting basis is to be sought in as comprehensive and widely-spread a scheme of public education as possible. It thus happens that the growth of popular instruction in this country may be said to be coeval with the development of its democracy in latter times. To the Governments that were installed after 1830 on the ruins of the oligarchies re-established by the "Pacte Fédéral" of 1815 is due, if not the foundation, certainly the vast extension of primary education in Switzerland; and although, as in all things in this singular and interesting microcosm called the Swiss Confederation, the laws on education vary in detail in every canton, they are based on the broad principle that every citizen is bound towards the State to provide his

children with the means of instruction afforded at the public expense.

That the Governments of Switzerland have earnestly and vigorously carried out the scheme they proposed to themselves cannot be doubted, when we note in their public expenditure the large proportion of money devoted to educational purposes; and that they have done so successfully must be granted, when we find that after little more than 30 years the spread of education is such that they can state in sober truth that hardly a child within the limits of the Confederation is utterly incapable of reading and writing, unless physically or mentally incapacitated.

The details of educational legislation in the different cantons are most perplexing, from their variety, and but a small beginning has yet been made towards reducing them into a statistical form accessible to those desirous of studying the question of education in this country. I shall endeavour, therefore, first to give a general sketch—very incomplete, I fear—of the broad principles common to all, adding to this report, in the shape of appendixes, more complete statements of the actual condition of education in some of the more important cantons, with which I have been obligingly furnished by the Federal Statistical Department.

Primary instruction is declared compulsory by law in the whole of Switzerland, with the exception of the canton of Geneva. The obligation goes thus far—that all parents and guardians are legally bound to give every child under their care instruction at least equal to that afforded in the public primary schools. The parents or guardians are at liberty, if they prefer it, to teach the child at home, or send it to a private school, or to a higher public school ("secundar-schule" or "progymnasium"). The State interferes only in the event of the child not duly receiving the minimum of education decreed by law.

The legislation on this question of education, for which the Swiss may be said to entertain a veritable passion, shows no shrinking from the severest enactments necessary to the due enforcement of a principle held sacred. Earnestly applying and putting into practice the striking words used by a French Minister of Public Instruction:*—"Le droit de suffrage a pour corollaire le devoir d'instruction, et tout citoyen doit savoir lire comme il doit porter les armes et payer l'impôt," the Swiss have made the neglect of parents and guardians an offence against society, punishable by fine, and in some cases even by imprisonment.† The obdurate father who persists in refusing to let his child attend the public schools, and is utterly neglectful to teach it at home, may, indeed, according to the letter of the law, run the risk of seeing it committed to the custody of others.

The schoolmasters are bound to keep regular registers, showing the number and proficiency of the scholars, and specially noting any irregularities in their attendance. These registers are periodically examined by the District Inspectors, and in any case of confirmed delinquency being brought home to parents, the penalties above mentioned may be enforced.

To the honour of the Swiss, as well as of other nations who have, within the last thirty years, successfully applied the same principles of

* Rapport à l'Empereur sur l'Etat de l'Enseignement primaire pendant l'année 1863.

† In the official report for 1864, published by the Board of Public Instruction of the canton of Lucerne, I find that the following penalties were inflicted, during the year on negligent parents: fines to the amount of 222 francs, 24 days' imprisonment, and 7 days' compulsory labour.

general primary instruction, it may be stated that the enforcement of these penalties is now seldom necessary.* Three anecdotes respecting this country, Prussia, and Baden, two of which are related by M. Duruy, French Minister of Public Instruction, in his report above quoted, illustrate in a remarkable degree the marvellous results of the compulsory system, and the strong hold it has already obtained on the consciences of the people.

At Geneva† a member of the Genevese section of the Swiss Statistical Society, wishing to test a system of primary instruction to be applied to adults, was at great trouble in finding a person wholly incapable of reading and writing. After as painful a search as that of Diogenes, he at last succeeded in securing his man, who, when examined, proved to be no citizen of the Republic, but a simple Savoyard.

M. Duruy gives the companion anecdote to this, about Prussia. An officer, charged at Potsdam with the military instruction of the Landwehr, found, in the course of 12 years, no more than three recruits wholly incapable of reading and writing. The fact was thought deserving of inquiry, when it was ascertained that the illiterate phenomena were all three sons of boatmen, born on the river, and whose lives, passed in floating up and down the river, had afforded them no opportunity of frequenting the schools on its banks. M. Duruy likewise mentions the experience of a French "sportsman," who, crossing the Rhine for a few days' shooting in the Grand Duchy of Baden, offered a florin a head to some children, to act as beaters for him, and to his surprise saw what he naturally thought a tempting bribe rejected by the parents, on the plea of its interfering with attendance at school. I know no instance of a Swiss peasant's zeal for his children's education having been put to so critical a test, but I think it is only fair to assume that, despite adverse proverbs, he would have stood it as triumphantly as his Swabian kinsman.

I have said before that in this matter of education, the Swiss people manifest a veritable passion, and it is indeed a thing worthy of sincere admiration, though but natural, perhaps, in the land that gave birth to Rousseau, Pestalozzi, Fellenberg, and others, to note what heavy, self-imposed, pecuniary sacrifices they cheerfully make to the cause. The public foundations, the private gifts, the State contributions devoted to education by this otherwise thrifty, close-listed race, may be truly said to be noble in the extreme. As will be seen by the following table, compiled from the financial statements published by the cantonal Governments for the years 1864, 1865, and 1866, the State expenditure for educational purposes throughout Switzerland averaged for those years the sum of 4,636,503 francs, twenty years ago‡ the same expenditure only amounted to 2,506,175 francs.

* It is officially stated, with respect to the Grand Duchy of Baden (a model State as regards public instruction), that the application of penalties for non-attendance of boys at school is now almost unknown; they have sometimes to be applied, and that seldom, for non-attendance of girls. In the Grand Duchy of Saxe Weimar no infraction of the rules respecting attendance at school has been known for the last 40 years.

† Primary instruction is not, strictly speaking, compulsory at Geneva, but, as will be shown in a separate account of the state of education in that canton, the results of the existing legislation are identical with those of the legislation of the rest of Switzerland.

‡ Franscini, Nuova Statistica della Svizzera, edition of 1847.

TABLE.

Cantons.	Population according to Census of December 10, 1860.	Number of primary or commercial schools.	Attended by		School-masters.	School-mistresses.	State grants (1.) and expenditure.	Proportion of schools to population.	Observations.
			Boys.	Girls.					
							Francs.	1 school per inhab.	(1.) Under this head will be found the entire State expenditure for schools, the greater portion being incurred on account of primary schools. I have no means of strictly annlyzing the sums given and thus stating the proportion assigned to the various categories of schools.
Berne	467,141	1554†	87,080	Boys & girls.	867	302	985,651	301	
Zürich.	266,265	386†	48,272	ditto.	529	..	860,400	690	
Vaud	213,157	not given.	not	Given.	391	89	350,142	—	
Aargau	194,208	301	30,148	Boys & girls.	477	30	346,430	645	
St. Gall	180,411	399	19,655	13,248	not	Given.	104,623	464	
Lucerne	130,504	444	not	Given.	137	13	233,445	294	
Ticino	116,343	469	8,519	8,193	231	232	123,830	248	
Fribourg	105,523	312	11,306	7,542	234	63	64,736	338	
Valais	90,792	396	7,582	6,898	not	Given.	38,295	229	
Grisons	90,713	not given.	not	Given.	264	..	97,265	—	
Thurgau	90,080	not given.	not	Given.	not	Given,	114,536	—	
Neuchâtel	87,369	303	6,902	6,854	136	164	147,100	288	(2.) These figures include the scholars in all the schools of the canton, both primary and secondary.
Geneva	82,876	122†	2,797	2,501	not	Given.	367,678	679	
Soleure	69,263	176	9,230	Boys & girls.	182	6	161,405	395	
Bâle Campagne	51,582	75	4,121	4,061	103	93	158,344	688	
Appenzell Ausser Rhoden.	48,431	not given.	not	Given.	not	Given.	17,290	—	(3.) No accounts appear to have been published respecting the schools in the small half-canton of Appenzell. Inner Rhoden.
Schwyz	45,039	60	1,615	1,749	45	22	19,971	751	
Bâle City	40,683	not given.	(2.) 2,811	2,390	not	Given.	304,106	—	
Schaffhausen	35,500	not given.	not	Given.	not	Given.	104,356	—	
Glamo	33,363	38	4,021	Boys & girls.	55	..	10,527	1,112	
Zug	19,608	48	1,120	1,056	32	20	14,900	408	† Bern, 85, private schools, included.
Uri	14,741	23	925	967	37	10	4,655	641	
Obwalden	13,376	34	1,351	Boys & girls.	17	17	6,500	393	† Zürich, 19, private schools, included.
Nidwalden	11,526	33	1,261	ditto.	18	13	318	349	† Geneva, 48, private schools, included.
			Scholars, 304,175				4,636,503		

To this amount of 4,636,503 francs should be added the annual sum paid by the Federal Government for the support of the Polytechnic School (or Technical University) at Zürich, the only federal educational establishment in the country. In the budget for 1868 this charge is put at 314,000 francs,

The entire federal and cantonal State expenditure for education reached, in 1864, the sum of £4,938,947, or about £197,550, or 196 francs per head of the population of Switzerland.* The entire public expenditure amounting to 36,171,644 francs, the proportion of it devoted to public education attains the high percentage of 13·65 per cent.

But these figures are far from representing the entire resources devoted to public education in Switzerland. Most of the cantons and communes have long possessed special funds (schul-fonds) for public instruction, and when such funds did not exist, the communes have voluntarily taxed themselves to create them. Thus in reality the State contributions above mentioned are but auxiliary sources of revenue, chiefly spent in assisting such of the communes as are either entirely, or in part, unable to defray the educational burthens imposed upon them by law.

M. Franscini, writing twenty years ago, estimated the value of school funds known at that time to exist in twelve, out of the twenty-two cantons, at 22,577,430 francs, thus distributed :—

Table of School Funds.

Canton.	Period.	School Funds.
		Francs.
Argavie	1843	5,133,720
St. Gall	1844	4,500,000
Zürich	1844	3,525,000
Bâle City ..	1844	2,190,000
Thurgau	1844	2,090,000
Solathurn ..	1842	1,175,000
Geneva	1842	975,000
Lucerne	1837	854,210
Berne	1840	839,500
Grisons	1845	666,000
Glarus	1843	450,000
Schwyz	1845	179,000
		22,577,430

* It is interesting to note the increase in the last 40 years of the Government expenditure for education in five of the principal cantons as illustrated by the following table :

Canton.	Period.	Annual Expenditure.	Period.	Annual Expenditure.	Period.	Annual Expenditure.
Aargau ..	1827	27,439	1844	116,192	1865	346,430
Vaud. ..	1827	57,444	1844	228,680	1865	350,142
Zürich† ..	1827	28,735	1844	164,042	1865	860,400
Grisons ..	1826	11,000	1843	35,500	1864-65	97,265
Berne† ..	1822-30	14,350	1832-40	145,750	1865	985,651

† For primary instruction.

This table comprises both cantonal and communal property, either real or funded, the proceeds of which were applied exclusively to educational purposes. M. Franscini states that, not knowing the exact value of the school property existing in other cantons, such as Vaud, Fribourg, Bâle, Campagne, &c., he estimates the whole amount of such property in Switzerland at 25,000,000 francs, or £1,000,000.

A considerable portion of those splendid endowments was even at that period derived from what had formerly been church or conventual property, secularised after 1830. Additional property coming from the same source has more recently been appropriated to similar purposes, and although I have no means of arriving at the exact amount of the increase in the school property in Switzerland since 1847, I am safe in stating that it has been very considerable.

Let us take, for instance, the following statement of the communal finances of the canton of St. Gall,* for the year 1863-64.

The entire property of the communes of this canton, 92 in number, with a population of 180,411 souls (census of December, 1860), amounted to 62,830,069 francs. The receipts for the year were 3,772,392 francs, and the expenses 3,768,233 francs. No less than 7,817,842 francs, or about one-eighth of the entire property, and 43·33 francs per head of the population, belonged to the schools, 4,274,199 francs falling to the share of the primary schools. This shows an increase of at least 3,300,000 francs in school property in the last nineteen years. 4,986,574 francs of the whole capital was invested in funds bearing interest, the rest, amounting to 2,831,268 francs, consisted of real property, dues, &c. The income of the schools is put at 575,392 francs, the expenditure at 571,981 francs. Of the income, 241,834 francs were derived from the interest of the capital, 190,042 francs were the proceeds of taxation, and the balance, of 143,516 francs, is described as coming from other sources not specified. Private gifts and legacies very probably helped to swell the little amount. The state property of the canton amounted, in 1864, to rather more than 6,000,000 of francs; the state expenditure was 1,450,321 francs, of which 104,623 francs were applied to public instruction.

The receipts of the communes of the canton of Vaud, 389 in number, with a population of 213,157 souls, reached, in 1863, the sum of 3,985,256 francs, whilst the expenses amounted to 3,921,956 francs, of which 672,399 francs were absorbed by public worship and education. Striking as are the above figures, the sums bestowed from private sources on charity and education are yet more impressive. The small half canton of Appenzell Ausser Rhoden, with a population at the last census of no more than 48,431 souls, deserves to be quoted as an example, taking, as it does, a noble lead in this matter of private donations. The State Government of the canton contributes no more than 15,200 francs for educational purposes, yet the schools are among the most numerous and flourishing of the Confederation; and the salaries of the schoolmasters, although entirely defrayed by the communes, rank among the highest in Switzerland. As regards private donations, I think the following account of sums given or bequeathed in this half canton to the communes or the state for charitable or educational purposes from 1848 to 1863 may fairly be described as munificent:—

* The Federal Statistical Department are at present engaged in drawing up tables of the finances of all the Swiss communes. When this laborious work shall have been completed, but not till then, it will be possible to state exactly the amount of Swiss expenditure for the poor, the public schools, public works, &c.

Year.	fr.	cents.	Year.	fr.	cents.
1848	98,148	22	1857	44,030	25
1849	189,762	18	1858	56,290	44
1850	76,963	93	1859	229,846	06
1851	27,642	00	1860	58,448	60
1852	33 843	56	1861	48,376	06
1853	48,861	39	1862	36,371	70
1854	42,604	67	1863	51,110	00
1855	62,452	45			
1856	37,393	04	Total fr.	1,142,102	97

The population in 1850 being 43,621, and in 1860 48,431, the mean number of inhabitants was 46,026, so that these legacies and donations amount to 1·55 francs per head of the population in each year. Unfortunately, the other cantons do not furnish similar accounts, but everywhere, in a greater or lesser degree, the same generous custom obtains among the wealthier classes of marking each great event in life, such as marriage, the birth of a child, the inheritance of property, down to the final surrender of all earthly things, by gifts in favour of the poor or ignorant. This custom acquires additional importance when it is recollected how heavy are the burthens imposed in some districts on the richer inhabitants for the support of the poor, the poor rates in the Entlibuch, for instance, attaining as much as 24 per cent. of the entire income of the landowners. To those desirous of inquiring into the remoter causes of this impressive manifestation of a spirit akin to that of which we in England are so justly proud, it may be pointed out that history furnishes one of the most satisfactory explanations. The Swiss owe their honourable pre-eminence in the exercise of public charity in a great measure to their exceptional good fortune in escaping the ravages of the two fearful contests which, lasting respectively thirty years and seven years, swept away in a general ruin the noble foundations and endowments bequeathed to the Germanic races of the empire by their ancestors of the middle ages. The German-Swiss has received the tender, thoughtful, mediæval custom, unbroken, and hallowed by the lapse of centuries, and religiously observes it to the present day. Perhaps, however, he is too apt to forget its origin, and fondly to cherish it as a child of the democracy he dearly loves, when it is in reality but the nursling of the sturdy Conservative disposition which has served both him and his freedom so well. But "palmam qui meruit ferat;" to our Germanic forefathers in the "dark ages," and especially to their old church, we latter day people owe more than we care to admit of our spirit of charity and of our love for the broad light of education.

If the Swiss have inherited the spirit of charity, they have, on the other hand, undoubtedly made the spirit of religious toleration their own. It is one of the most creditable features of their educational system,* and appears the more striking that the country is nearly equally divided between Roman Catholics and Protestants, so mixed in some cantons as to be barely distinguishable, so sharply divided in others as to have preserved intact the most marked characteristics of either creed, and all, barely twenty years ago, engaged in the bitterest

* In some respects this religious toleration extends beyond the question of education. In many mixed parishes the same church is used at different hours by both Protestants and Catholics, and is kept in repair at the cost of both. The Catholic decorations and symbols of worship are left undisturbed, or at most, as in Glarus, a curtain is drawn before the altar during the Protestant services. Glarus gave a noble example of religious concord on the occasion of the great fire which a few years ago reduced the cantonal capital to ashes, when both Roman Catholics and Protestants joined in a common resolve to build up one church for the use of both confessions.

civil strife. For these reasons it is worth inquiring how a uniform educational system, without distinction of creed, and with a due regard to liberty of conscience, has been successfully carried out throughout the Confederation.

Denominational primary schools, properly so called, hardly exist in Switzerland, for the Catholic communal schools, in the purely Catholic cantons, where the Protestant minority is insignificant, and where education is directed by the clergy, do not, strictly speaking, come under that description. Let us take, for instance, the canton of Fribourg, perhaps the chief stronghold of Catholicism in this country. The law there, as elsewhere, has decreed the establishment of one primary school at least in each commune, and thus only recognizes communal schools, without distinction of religion. In the old canton, as it is termed, the schools are Catholic, whilst in the former bailiwick of Morat they are Protestant. They may, however, be frequented by the children of either confession, or even by Jews. Nevertheless, the Protestants in the old canton have founded numerous schools, five at Fribourg, twelve in the Singine district, two in the Lake district, two in the Sarine district, &c. These establishments, which are supported chiefly by biblical societies in other cantons, are governed according to rules framed by their founders, and are under the supervision of the Synod of Morat. These schools, however, are strictly private. Some of them, with a view possibly to benefiting by taxation, have lately sought to be placed on the footing of the recognized public communal schools, but hitherto without success. In the same way, wherever the Catholic minority in Protestant cantons has found itself powerful or rich enough to endow separate schools, it has done so,* and such schools which may correctly be termed denominational, exist at Carouge in the canton of Geneva, as well as in the cities of Bâle and St. Gall. But in the Protestant cantons, containing Catholics in smaller numbers, such as Berne for instance, mixed primary schools (pautätische schulen) have been everywhere introduced, and are attended by both the Protestant and the Catholic children. Nor can these schools be termed strictly secular; elementary religious instruction, consisting of a short catechism, containing the simple truths common to all Christians, and at most, of readings from the Scriptures,† is given in all to the scholars of both confessions, and it is in general only in their tenth or eleventh year, when the time comes for them to be prepared for confirmation by their own priests, that the Roman Catholic children cease to attend during this religious instruction with the rest.‡ The preparation of the Protestant children for confirmation does not commence till they have attained the age of fifteen, and is entirely confided to the "pasteur" of the parish. The candidates for confirmation are generally taught publicly in church, those belonging to wealthier families being, if they prefer it, instructed at home. After a preparation of one year in the former, and of six months in the latter case, they are confirmed, and a certificate of confirmation is delivered to them by the "pasteur."§ In Berne, and in other cantons, persons

* The late Roman Catholic Curé of Berne, Mgr. Baud, established a denominational primary school in that city.

† A law was passed in Berne in 1866, in spite of strenuous opposition from the clergy, prohibiting all primary schoolmasters from extending their religious teaching beyond the catechism above mentioned.

‡ The catechism being taught only twice a week at stated hours, the children of strict Roman Catholic parents are enabled to stay away if they please, but in many instances they do not avail themselves of the option.

§ The "pasteurs" receive Government remuneration for attending to the instruction of the candidates for confirmation. They are responsible for the due

about to be married are bound to produce this certificate before they obtain their marriage licence from the authorities. The system of mixed primary schools in the Protestant or mixed cantons may be shortly described as providing for general elementary instruction, religious and secular, of a nature to offend the consciences and scruples of neither of the two confessions, the religious instruction in particular being given on fixed days and at regular hours, so as to allow the children of Catholics, Dissenters, or Jews, to absent themselves from it if they think fit. The real religious training however, is left to the clergy of both confessions, and takes the form of preparation for Confirmation, commencing with the Roman Catholics at the age of eleven,* and with the Protestants at that of fifteen. This system of mixed schools is said to work very well, even in cantons like St. Gall, where the Roman Catholics are in the proportion of five to three to the Protestants, and where, in the years immediately preceding the war of the Sonderbund, violent feuds reigned, on the subjects of religion and education. It is certainly gratifying to see, in cantons like the Grisons where the same communes, sometimes the same villages, contain both Catholics and Protestants, so mingled as to make separate schools impossible, the children of both confessions sitting on the same benches and sharing the same instruction. Still, however remarkable in general the religious tolerence shown with respect to education, nowhere, I believe, in Switzerland do the school regulations contain so liberal a "conscience clause" as that in force in the French schools, according to which dissenting pupils (there are about two millions of Protestants in France, against thirty-six millions of Roman Catholics) may not be forced to be present during the religious exercises, and are taught apart by their own clergy.

Indeed some of the cantonal laws respecting Protestant Dissenters belonging to sects distinct from the dominant Calvinistic and Zwinglian confessions, such as Anabaptists, Irvingites, &c., are far from tolerant. In Zürich, for instance, the children of Dissenters are compelled to attend the religious instruction given in the schools, and are only dispensed from confirmation. Severe enactments exist too in Aargau and St. Gall on the subject of Dissenters, and in the latter canton sectarians have sometimes been made to undergo compulsory baptism. On the other hand Neuchâtel, Geneva, and of late years Vaud, give the example of the most complete toleration in all religious matters. Geneva and Neuchâtel have gone further than any of their confederates in the matter of education, but they have done so by boldly secularizing all their public schools to the fullest extent, and making religion a completely distinct branch of instruction, not taught in the schools, and left entirely to the clergy.†

preparation of all the children in their parish at the proper time, and are bound to make periodical visits to all their parishioners, and to keep registers of the condition, age, occupation, and moral conduct, &c., of the members of each household. Thus it happens that the electoral lists are chiefly compiled from their registers as giving the most reliable and complete information respecting the parish.

* The French report on public instruction before mentioned, points out as one of the reasons of the superiority of Protestants over Roman Catholic countries, in the matter of primary instruction, that the Roman Catholic children are confirmed at an earlier age (four years, at least, before the Protestants), and therefore often cease to attend school after they have learnt their catechism and received the rite of confirmation. Another cause assigned is the general knowledge of the Scriptures required of Protestants, which accustoms them to read at a very early age.

† Article 16 of the "Règlement Général pour les Commissions d'Education des Ecoles Primaires," of the Canton of Neuchâtel, says, "La direction et la surveillance de l'enseignement religieux dans les écoles étant exclusivement réservées aux fonctionnaires ecclésiastiques, les commissions d'éducation n'interviendront pas dans

A Geneva statesman, high in office, told me that he considered Western Switzerland to be in her educational, as well as in other institutions, fifty years in advance of the rest of the Confederation. It is probable that in no distant future this progress, if such it be, will be imitated by other cantons.

It must not be assumed from the foregoing sketch that the spirit of religious prejudice is quite extinct in this country. In Uri a man may still be made to suffer a degrading punishment on account of heterodox religious opinions, whilst in Berne the "Grand Conseil" has very recently shown a strong religious bias in decreeing the exclusion of the Roman Catholic sisters (socht schwestern) from the public schools of the Bernese Jura,† where they had hitherto been allowed to give instruction. But harsh as the measure may appear, it was not improbably dictated by a fear of consequences similar to those observed in France, where the "*congrégations enseignantio*" have, in the course of twenty-two years, more than doubled the number of the pupils frequenting their free schools. In 1843 they taught 22 per cent., or less than a quarter of the whole French school population; in 1865 their scholars amounted to 37 per cent., or more than one-third of the children attending school.

The statistics of education in Switzerland are as yet very incomplete, and I am enabled to give but few figures to show the results obtained under the compulsory system. There are 3,071 communes in the whole country, containing nearly 7,000 primary schools. The statistics given in the table at page 120 of this report, respecting 18 cantons out of the 25, show that more than one-sixth of the population, or 304,175 out of 1,890,109 inhabitants, were in the public schools. I have no means of arriving at the proportion of absentees, but in taking separate cantons I find the following facts:—In Ticino (by no means a model canton), out of 18,927 children who should have attended the schools in 1862, only 774, or one-twenty-fourth, were missing. At Fribourg there were 18,848 scholars on the school-books in 1865, against only 15,106 in the preceding year; yet notwithstanding this increase of 3,742 scholars, I find that but 139,693 days of non-attendance not satisfactorily accounted for were registered in the year, 150,109 in 1864, which, taking all the school days in the year, only allots about seven days to non-attendance of each scholar. Another fact worth noting about this ultra-Catholic French-speaking canton is that the German (Protestant) schools had increased by three in the course of the year, whilst the French (Catholic) schools had diminished by six. In St. Gall the official accounts of the school-year 1865–66 show 34,526 scholars on the books (inclusive of the scholars of the "Arbeits schule"), as against 32,903 in the previous year. Of these 26,378 were primary scholars, and the population at the canton at the last census being 180,411, about one-seventh of the inhabitants appears to have been in the communal schools. In the canton of Berne 84 new schools were opened in 1866, raising the entire number to 1514. They were attended by 89,249 children of both sexes, showing an increase of 2,169 on the preceding year. It may be affirmed with certainty that the number of schools and of scholars increases yearly everywhere, the least observable increase being found in the poorer, mountainous

ce domaine, comme aussi de leur côté les autorités ecclésiastiques se renfermeront dans la compétence qui leur est attribuée par la loi sur l'instruction primaire."

† The Bernese Jura is Roman Catholic, and formed part of the ancient Bishopric of Bâle. It was handed over to the canton of Berne in 1814, in compensation for its former territories of Aargau and Vaud which were raised to the rank of cantons. The Bernese Jura, separated from the rest of Berne by religion and language and often discontented, has been facetiously termed the "Bernese Poland."

cantons, like Uri, Appenzell Inner Rhoden, Palais, &c., where the communes are very extensive and sparsely populated, and have neither means for nor object in attempting to go beyond the general obligation imposed upon all communes with a population containing about 30 children of school age of keeping one school at least open.

Where statistics fail, I must needs turn to other sources for the information wanted. I have it on the authority of an eminent medical practitioner at Berne that in a long experience in the hospitals of that city he has often had cause to be surprised at the thorough elementary knowledge shown by the children of perfect vagrants and paupers, so strictly and conscientiously are the benefits of primary instruction extended even to the poorest and most abandoned classes. Much has been said about the hardship to the poor of depriving them of the assistance of their children in agricultural or other work for the sake of forced attendance at school, but no such complaints would be listened to in Switzerland, and it may in truth be said that poverty in this country is seldom met together with its elsewhere inseparable companion, complete ignorance. At the same time, every inducement is held out to the poor for sending their children to the schools. Not only is instruction provided for them free of cost in all the cantons, on its being well established that they belong to the indigent classes; but the rule which obliges all scholars to make a decent appearance in school as regards dress and cleanliness is turned to good account in this respect. The child that otherwise would run about barefoot in idleness is certain of being presented with shoes at the public cost as soon as it attends school. Gifts of clothing are made at Christmas or new year, and the accounts of many schools show a considerable outlay in the purchase of cloth and woollen stuffs for distribution to the poor free scholars. In some districts even, Bâle Campagne for instance, substantial premiums are, in certain cases, granted to the poor whose children are specially assiduous. The Swiss rightly consider all these disbursements to be amply repaid by the fact of their towns and villages containing indeed paupers, but being free from the heavier curse of a brutal "prolétariat," steeped in ignorance, and ready for every species of outrage and disorder.*

As a rule, daily attendance in the primary schools, in the majority of the cantons, is obligatory, for the youth of both sexes and of all classes, from the richest to the poorest, between the ages of six and fifteen.† In the three cantons of Bâle Ville, Bâle Campagne, and Schwyz, the obligation extends only to the age of 12; in others the period of instruction is prolonged to that of 16 and 17. In general as before stated, the age of confirmation marks the limit of primary instruction. In some of the cantons of Eastern Switzerland the scholars are divided into categories according to age. From 7 to 12 they are bound to frequent the schools five days a week; from 12 to 15 only one day; at the age of 16 for two hours only. This system of categories has the advantage of enabling the children to contribute at an earlier age to the support of the family, besides giving them leisure to acquire the first rudiments of the trade to which they may be destined.

* At the same time the resident of Bern cannot but be unpleasantly impressed by the uncouth deportment, verging upon rudeness, of the lower classes. Education has not yet succeeded in overcoming the gross habits of intemperance of the population of this canton, and drunken broils and assaults, too often ending in bloodshed are of frequent occurrence. The "Jura" newspaper, of November 26, reports no less than four cases of manslaughter ("rixes au couteau"), and deaths from excessive spirit drinking.

† In the Canton of Bern and others the schools are open for six hours every day excepting holidays.

Taking into account the varied necessities of life in a mountainous country, the school legislation establishes schools of different elevations. Thus in the Alpine districts primary instruction is confined to the winter months, beginning with the return of the herds of cattle from their summer pasturage on the higher mountain slopes, and ending with the great holiday of early summer, when nearly the whole population migrate to the heights, leaving behind them all school and other occupations. It is said, and it is credible, that in these winter schools, held in the death-like stillness of the upper valleys, where every sound is muffled by a thick mantle of untrodden snow, and all communication with the busy outer world is cut off at times for weeks, the scholars make singularly rapid progress, and learn as much, in a shorter time, as the scholars in the flat country and in the towns. In fact, the duration of the schools varies nearly everywhere; in some districts on account of the employment of some of the scholars in field or other work, in others on account of the difficulty of their reaching school from a distance in winter time.*

There are but few factory schools in Switzerland, the factory children, as a rule, attending the communal schools with the rest. The five great manufacturing cantons of Zürich, Glarus, St. Gall, Aargau, and Thurgau, have strict laws, mostly of recent date, regulating labour in the factories, with a special regard to guaranteeing the proper education of the factory children. Thus in Zürich the children required by law to attend the daily schools (Altagsschüler) cannot be made to work more than five hours a day in the factories; the working hours to be taken in the interval from five in the morning to seven in the evening, or from six to eight or seven to nine; no night work (from nine in the evening to five in the morning) is allowed, and on no account are the children to be employed on Sundays and holidays. All mill or factory owners are further expressly bound to allow the children up to the age of sixteen in their employ full time and opportunity for receiving religious and public school instruction. Workmen (older than sixteen) who, after having gone through the elementary schools (Volksschulen), may wish to attend a technical or other higher educational establishment, have a right to whatever free time may be necessary every week for that purpose. In the canton of Glarus none of the children required by law to attend daily school (Alltagsschulpflichtige Kinder) can be employed in factories. The same regulation is enforced in St. Gall. In Aargau no child is allowed to work in a factory until after having completed its thirteenth year. The factory laws of Thurgau explicitly enjoin "all mill and factory owners not to hinder the religious instruction and attendance at church, as well as at school, of the children in their employ from the age of five till that of fifteen. They are bound, in as far as in them lay, to see that such attendance, both in church and at school, is punctual." The school regulations of certain other cantons also contain similar provisions for the proper education of factory children, varying, however, as to the age at which the obligatory frequentation of the schools (Schulpflichtigkeit) ceases.†

I have said that every commune containing more than from 20 to 30 children upwards of five years old is bound to open at least one primary school for boys and girls, communes with less than that number of school children being united to the adjoining one, and

* Of the 329 communal schools existing in the canton of St. Gall in 1865, only 120 were open all the year round, whilst there were 170 open half the year.

† With respect to the facilities granted to factory children for frequenting the schools, vide note appended to this report.

forming one school commune (Schulgemeinde) with it. The commune is further required to provide and keep in repair, at its own expense, a proper building for the school. The regulations on this point are in general very explicit and stringent. The building must be in a good and commodious situation, and be easy of access; it must contain a certain number of rooms of a convenient size and height, sufficiently well lighted and ventilated. It must likewise afford adequate lodging accommodation for the schoolmaster or schoolmistress. These and similar conditions being strictly insisted upon, it happens that in many cases the school buildings are among the most substantial edifices of Swiss towns and villages.

The communes have likewise to defray in whole, or in part, the salary of the schoolmaster. In some cantons, as Appenzell Ausser Rhoden for example, the entire salaries are at the communal charge, nor are they by any means the most liberal. But, as a rule, the State Governments contribute one-third or two-thirds, the portion supplied by the communes varying according to the resources at their disposal. The pay of a primary schoolmaster in Switzerland in country districts averages between 800 and 1,000 francs a-year, including the value of the contributions he receives in kind, such as lodging, fuel, a patch of ground to cultivate, &c. Of course the salaries vary with the resources of the canton or district, and with the duration of the schools. The highest paid schoolmasters are those in towns, paid entirely in cash; and at Zürich, for instance, receiving as much as 2,400 francs a-year. The worst paid are perhaps the country schoolmasters in the Valois, with salaries ranging from 200 to 500 francs. On the whole, the salaries bear favourable comparison with those in other countries, as in France, where the average pay of the "instituteur primaire" is stated to be 778·52 francs.

There are a certain number of schoolmistresses in Switzerland, as may be seen by reference to the table at page120; and in the Catholic cantons these are often taken from among the sisters of mercy. Their number, however, diminishes every year, and there is a marked tendency everywhere to replace them by male teachers. Few of the clergy are engaged in tuition in the primary schools, and those few are to be found in the Catholic cantons. At the higher schools alone in the Protestant cantons are the clergy to be found, and they have played of late a great part at the "Normal Schule," or seminary for teachers at Münchenbuchsee, in the canton of Berne. Both male and female teachers are formed in seminaries at the expense of the State. There are 18 such establishments in Switzerland, where the candidates are prepared by a three years' course of study, and receive a certificate of capacity after having passed a regular examination. At Zürich every teacher is required to have worked his way through the primary and secondary cantonal schools up to the age of sixteen, and then has to pass four years in the "Normal Schule" for schoolmasters.

It has often been a moot point with the advocates and admirers of the compulsory system, whether the education bestowed under that system should or should not be entirely gratuitous. On first consideration, it would seem hardly to admit of a question that in compelling parents to send their children to schools paid for out of the pockets of the community, the State tacitly undertakes to afford them gratuitous instruction.

Such is the view taken in France by the present Minister of Public Instruction, than whom no one can be more enamoured of the compulsory system, and as regards the French lower classes, his opinion is properly based upon the marked aversion they shew for

anything like expense. Whilst urging therefore the introduction of this system as being the only one capable of thoroughly educating the masses, M. Duruy distinctly states that it could never be applied in France except in the form of entirely gratuitous teaching. There certainly seems to be something radically wrong in a system like the present French one, which admits of free schools in towns, and at the same time in some of the country districts allows school money to be charged to the amount of 30 francs a-year for each scholar;* and there may be some foundation in M. Duruy's theory that the attraction of free schools and "salles d'asile" has contributed with other causes to increase the alarming influx of the French rural population into the towns. However necessary free schools may be to the success of compulsory education in France, in other countries, like Prussia, Saxony, and Switzerland, where the instruction of the entire population has been so completely carried out as to be a thing of the present and not of the future, the principle of schools where school-money is charged has been in general adopted.† In Switzerland, which, among other interesting particularities, has the merit of being a field for experiments of every kind and on every subject, it is acknowledged that after a fair trial the free schools have proved to be the least attractive. In Zürich which is generally allowed to be a model canton in the matter of education, in Bâle, in Aargau, in Thurgau, in Neuchâtel, &c., school-money has been everywhere introduced, and it is considered to be proved beyond dispute that the parents are much more zealous in sending their children to school where made to pay for doing so, than where offered the temptation of education entirely free of cost. The school-money charged is very small in amount, averaging 3 francs per scholar and per annum in the country districts, and 6 francs in the towns. At Zürich the charge is made for all children indiscriminately, and the father who teaches his child at home is obliged to pay for it as if it attended the public school. At Glarus the charge is only 2 francs for each child, and in the canton of Berne an entrance fee of 1 franc paid once for all for each scholar is all that is required. Gratuitous schooling, on principle, for all scholars,‡ exists in several of the cantons as Geneva, Fribourg, Soleure, St. Gall, &c., but, as before stated, shews less favourable results as regards regularity of attendance. The public communal schools in the city of Berne afford a striking example of some of the disadvantages of the gratuitous system. They have fallen into such discredit that the children of families with any pretensions to respectability are sent to the town school at a cost of 60 francs per annum for each scholar sooner than allowed to frequent establishments that have nearly sunk to the level of free schools for the poor. In the canton de Vaud, too, the original gratuitous system has been given up, and an "écolage" of three francs has been introduced by law. Altogether the principle most approved in this country seems to be, that primary education should be cheap enough to be accessible to all, but still should be paid for.

* The "écolage," or school money, in France has risen since 1858 from an average of 1·19 fr. to an average of 1·68 fr. per month; in some places in reaches 2 fr., 2½ fr., and even 3 fr. 25 c.

† It is due to the gratuitous system to state that it has been applied on the greatest scale, and with undeniable success, in no less a country than the United States.

‡ The communal schools in many instances are open free of charge to the children of citizens (Bürguskinder), whilst the children of settlers from other communes or cantons (Niedergelassene) have to pay school-money. This is explained by the fact of the schools being in a great measure supported by the common funds belonging to the citizens which entitle them to education for their children free of cost.

Instruction in the Swiss primary schools comprises reading and writing in the mother tongue (German, French, or Italian, according to the canton), arithmetic and the first principles of geometry, drawing, singing, Swiss and general history, geography, and the elements of natural science. Gymnastics are also being gradually introduced, and female needlework is taught to the girls at fixed hours, in the girl and mixed schools.

I should far exceed the limits of this report were I to seek to give any account of the secondary and higher schools of Switzerland. I may mention, however, that great efforts are being made to induce as large a number as possible of the primary scholars to enter the secondary schools, which are not obligatory. With this view it is sought to reduce the cost of education in these establishments, which, although it only averages about 24 francs a-year per scholar (or rather less than the charge made in many of the French primary schools), is still considered too high for Swiss ideas. The acquisition of the second language, either, French, German, or Italian, taught in these schools, in addition to the mother tongue, is of most material advantage to the Swiss youth, divided as is their country into three distinct nationalities.*

There are besides numerous Sunday and evening schools in all parts of Switzerland, for the benefit of the working classes, which are said to have answered very well, and which contribute to raise the general educational level of the nation. There also exist five agricultural schools, which are reported to be attended with less success. I cannot, however, attempt to give any detailed account of them in this place.

The public schools are placed in each canton under the general control and supervision of a Board of Public Education, forming part of the Government of the State. This board appoints the district inspectors, whose duty it is to see that the regulations of the "Conseil d'Etat," or the decree of the "Grand Conseil" in matters of education are duly carried out. Subject to this supervision, the school business is mostly left to the local management of the school committees to be found in most of the communes. The power to appoint schoolmasters, however, is not left with the school committees, but with the assembly of the inhabitants of the commune, who elect out of a number of candidates who have passed the necessary examinations. The election is afterwards referred to the Cantonal Board of Education for examination and confirmation. The board likewise decides upon all questions regarding the course of the studies to be pursued in the schools, the school-books to be used, &c., and in general acts as a final tribunal of appeal in any controversies that may arise between the teachers and the local school authorities.

I think I have been enabled to show that the Swiss faith in the compulsory system is founded on an experience the more encouraging as it dates from barely 30 years. Should additional testimony be wanted in its favour, such can amply be derived from M. Duruy's report, several times already referred to.

In that interesting account of the condition of primary education in France the Minister dwells with great force on the absolute necessity of the introduction of the compulsory system, to be applied not only to the attendance of all children at school, but to the duration of such attendance. After passing in review the organisation of the costly

* The Swiss Federal Constitution declares the German, French, and Italian languages to be national languages of Switzerland.

French system (where the obligation of attendance at school has indeed been pompously proclaimed, but has remained a dead letter), with its vast resources amounting to 58 millions of francs a year, and its huge, but ill-paid, staff of 77,000 persons, employed in primary instruction alone, he sums up the results obtained. In 1863, out of 4,018,427 children between the ages of seven and thirteen, who should by law have attended school, 884,887, or considerably more than one-fifth, were absent. Out of 657,401 children who had left school that same year, only 395,593, or 60 per cent., could read, write, and reckon, whilst the remaining 262,000, or 40 per cent., had attended so short a time, or so irregularly, as to have learnt nothing, or at best to have taken away knowledge so insufficient as to be soon forgotten. One-third of the conscripts of the year could not read, and 36 per cent. of the persons married could not sign their names in the register. As regards the diminution in crime, although doubtless remarkable, M. Duruy points out that in 1863, out of 4,543 persons, of all ages and both sexes, accused of crimes, 38 per cent. were completely illiterate, and 43 per cent. only read and wrote very imperfectly, so that 81 criminals out of 100 in France had not had the full benefits of primary instruction. "En mécanique," exclaims the Minister, "une machine qui ne produirait pas plus d'effet utile serait l'instant réorganisée."*

Passing then, with exemplary candour, to foreign countries, his Excellency quotes the official statistics of Prussia for 1864, showing that only 3 per cent. of the recruits were illiterate, and that out of 3,090,294 children who should have frequented the primary schools, 130,437 only were missing, from which number must be subtracted all those who had been taught at home or in the secondary schools, and those physically or mentally incapacitated, he points to the example of Wurtemberg, where the primary schoolmasters receive salaries of no less than 500 florins (£43) a-year, he shows the clergy in Sweden, Norway, and Denmark, denying the rite of confirmation to all illiterate children; in Switzerland the Government of Bâle Compagne paying premiums to the poor whose children are regular attendants at school; and in the United States the laws of Connecticut declaring every citizen unable to read to be unworthy of exercising electoral rights. Finally, with the view apparently of enlisting more directly the sympathies of his Imperial master in the cause he has so much at heart, he brings forward an argument well deserving the consideration of a ruler of France: "apprenous leur à compter, et ils sauront bien vite calculer ce que coûte une révolution."

We in England need not, unfortunately, cross the Channel to find instances of countries where the population is not educated up to the Prussian or Swiss standard; and I confess that it was not without pain that, whilst engaged on the present report, I came across a Parliamentary paper just issued, stating, among other mortifying facts, that of 239,769 marriages registered in the whole United Kingdom in the year 1865, 23·70 per cent. of the men, and 32·98 per cent. of the women, did not sign their names upon the register, but made their mark.

On the same day on which my attention was called to this paper, and when I had written all the preceding matter, I was most obligingly

* It is but fair to the working of the French system to quote the following figures, taken out of M. Duruy's report, shewing the increase in the school population from 1832 to 1863:—

1832	..	1,934,624	scholars out of	32,510,934	inhabitants.
1847	..	3,530,135	„ „	35,400,486	„
1863	..	4,386,368	„ „	37,382,225	„

furnished by M. Stoessel, of the Federal Statistical Department, with a table, herewith appended, giving the entire number of scholars in the compulsory primary schools of each canton, the ages at which the obligation respectively begins and ceases by law, and the proportion of children within those ages who should have attended the schools according to the census taken on the 10th of December, 1860. A glance at this table speaks more eloquently of the thorough elementary training of the people, such as it is understood in this country, than any statements I have been enabled to make in the course of this lengthy, and I fear very diffuse, report. Of 413,209 children composing the legal school population of Switzerland in the year 1860, no less than 397,538 actually were in the schools in 1865, and this after subtraction of all the children debarred from education by mental or physical causes, and the not inconsiderable number of those taught in the middle and higher public and private educational establishments.*

HORACE RUMBOLD.

TABLE.

Cantons.	Number of Scholars who attended the Public Compulsory Schools in 1865.	Legal School age (completed years).	Corresponding Class according to Census of December 10, 1860.	Observations.
		From—to		
Zürich	*48,034	6 16	47,725	* Points to increase in the population.
Berne	*87,116	6 15	86,630	
Lucerne	19,676	6 16	24,178	
Uri	1,892	6 12	1,732	
Schwyz	5,487	7 13	5,076	
Obwalden	1,351	6 12	1,447	
Nidwalden	1,330	6 12	1,171	
Glarus	5,091	6 14	4,979	
Zug	2,515	6 13½	2,613	
Fribourg	15,106	7 15	15,752	
Soleure	9,181	6 14	9,952	
Bâle Ville	3,740	6 14	4,434	
Bâle Campagne	8,182	6 15	9,375	
Schaffhausen	6,740	6 17	8,170	
Appenzell Ausser Rhoden	*3,393	6 15	7,574	
Appenzell Inner Rhoden	1,215	6 12	1,236	
St. Gall	25,648	6 15	28,148	
Grisons	13,955	7 15	13,795	
Aargau	*31,816	7 15	29,434	
Thurgau	*18,000	5 15	16,667	
Ticino	16,612	6 14	19,887	
Vaud	30,500	7 15	35,236	
Valais	14,255	7 15	15,944	
Neuchâtel	*16,405	7 16	13,950	
Geneva	5,298	6 13	8,104	
	397,538	..	413,209	

The difference between the number of scholars given, and that of the corresponding class at the last census, is probably in reality somewhat larger, but is in part explained by the subtraction of the children prevented from attending school by infirmities, &c., as well as of those taught in the secondary and higher schools.

* See Appendix, page 290.

No. 17.

Mr. Jerningham to Lord Stanley.—(Received January 29.)

My Lord, *Stockholm, January 21, 1868.*

With reference to your Lordship's despatch of the 17th July last, and to my despatch of the 30th of November last, I have the honour to transmit a translation of a Report upon the School of Mines of Kongsberg, in Norway, which I have received from Count Manderstrom.

I have, &c.

G. H. JERNINGHAM.

Inclosure in No. 17.

Copy of a Report from the Directors of the Kongsberg Silver Mines to the Financial Department, dated the 24th of December, 1867.

(Translation.)

Norway.

In reply to the despatch of the Royal Financial Department, dated the 9th of the previous month, the Directors have the honour to forward the following answers to the questions annexed to the said despatch, so far as those questions refer to the Elementary Mining School at Kongsberg, which commenced its operations last July.

1. In addition to the public schools at Kongsberg, there is also an elementary mining school established there, intended to promote and facilitate mining pursuits.

2. This elementary mining school is connected with the silver mines at Kongsberg.

3. The object aimed at by this technical educational establishment is to impart instruction to able miners in certain special branches of knowledge.

4. The expenses of the school are defrayed from the resources of the silver works.

5. The number of pupils is eight.

6. The pupils (see Answer 4) enjoy free instruction, but must provide themselves with books, and with writing and drawing materials.

7. No other qualifications are required for the admission of pupils than that they shall have worked for some time previously at the silver mines, or at some other similar mines; and, also, that they shall continue so to work during their course of instruction. As the institution has only been in operation for the space of six months, the term of the course of study cannot yet be determined, but it is assmed that it will last from two to three years, with two days' instruction each week. The pupils, all of whom are males, must not be less than eighteen years of age.

8. No fixed standard of knowledge is prescribed for admission to the school. Those who have already been admitted have been elected on the recommendation of their superiors. The pupils must, however, at least be able to read and write, and be acquainted with the four first rules of arithmetic. Instruction is given in the elements of mineralogy, geology, mechanics, and physics; in mathematics; in the elements of arithmetic, geometry, trigonometry, and stereometry; in geometrical drawing, and land and mining surveying. The instruction is imparted

in the manner generally in use in this country. The pupils enjoy opportunities for the practical exercise of their acquirements.

9. The pupils do not enjoy any special privileges, but will, of course, find it more easy to obtain employment as overseers or foremen than other workmen. Hitherto, however, foremen have not been required, at any other works of this kind, to pass through a similar course of instruction.

10. The remuneration of the teachers is regulated by the number of hours they are employed. Teachers are appointed on the ground of their being known to possess the requisite knowledge. The teachers now appointed have all passed the mining examination at the University.

11 and 12. The Elementary Mining School has been established too recently to render it possible to reply to those questions.

The three inclosures annexed to the despatch of the Royal Department are herewith returned.

No. 18.

Sir H. F. Howard to Lord Stanley.—(Received Nov. 15.)

My Lord, *Munich, November* 9, 1867.

I have the honour to transmit herewith a copy of a note of the 4th instant, which I received yesterday from Prince Hohenlohe enclosing, for presentation to Her Majesty's Government, copy in duplicate of a project of law for the reorganization of the National Schools in Bavaria, submitted a few days ago by the Government to the Chamber of Deputies, with a view to its being discussed during the present session of the Legislature. I have, &c.

(Signed) HENRY F. HOWARD.

Inclosure 1 in No. 18.

Prince Hohenlohe to Sir H. Howard.

M. le Ministre, *Munich, November* 4, 1867.

J'ai l'honneur de vous envoyer ci-joint, avec prière de les remettre entre les mains de votre Gouvernement, deux exemplaires du projet d'une loi d'école élaboré par le Gouvernement et communiqué il y a quelques jours à la Chambre des Députés pour être discuté dans la présente session de la Diète.

Je saisis, &c.

(Signé) PRINCE HOHENLOHE.

Inclosure 2 in No. 18.

Draft of a Law on the System of Popular Schools in the Kingdom of Bavaria, with statement of reasons, 1867.

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Tit. 1. On the legal position, employment, and appointment of teachers.

Tit. 2. On the salaries of teachers.

Tit. 3. On the duties of the teachers and the superintendence to be exercised over them.

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10th Division.

Concluding regulations and rules to be observed in passing from the old to the new organization.

Extracts from General Observations.

The older regulations on which the system of popular schools in Bavaria is based, date mostly from the year 1818, and in accordance with the State arrangements then existing, comprise both legislative and administrative measures, which, independently of their shortcomings and of their total want of organic and systematic connection cannot be regarded as sufficiently comprehensive when considered with reference to the present state of the law, and more particularly of the complete revolution that has been introduced into the criminal police law and of the proposed innovations in the existing legislation as to social matters. This condition of things constituted in itself a weighty reason for the introduction of a more systematic, more comprehensive and altogether improved organization of the popular schools, but more urgent reasons still may be found in the ever-increasing demands which the growing civilization of our times makes upon the popular school.

Our country need not, indeed, as regards these matters, fear comparison with other States, and it must not be forgotten that laws and regulations, and the formal organization of a school system, can only in a secondary degree contribute to the education of a people, and that

the most efficient means for promoting this education must be sought in the capacity, the zeal, and the devotion of the persons, who are called either directly or indirectly to participate in the work.

Nevertheless, the State may, by timely and well considered measures, by the education and bringing together of able teachers, by satisfactory provision for their material well being, and the security of their position, and by the removal of all obstructions, aid considerably in the promotion of the work.

If it be asked, what might be the character of the legislative regulations of an educational system, we would reply that the administration should, in respect of it, enjoy as great an amount of freedom as possible, and that the internal organization, in particular of the school system, should be left exclusively in its hands. The school must, if it is to accomplish its object, *i.e.*, to disseminate an amount of general culture in accordance with the claims of the times, keep pace with the pedagogic science of the day, and above all, with the requirements of practical life. The Government should, therefore, be in a position at any moment to make available for the school the experience gained in these directions.

Science and technics, the two principal factors of the internal organization of the school system, are by their nature incapable of being permanently determined in the manner in which this must be done by legislative enactment.

Every attempt at determining the mode of treatment of a scientific or technical question by means of legislative regulations, would either lead in the end to a state of perfect stagnation as to this science or art, or would necessitate such constant changes of legislation, as are at variance with the true character of law, and therefore detrimental to the popular consciousness of right.

Legislative interference ought to be limited to regulating the external conditions of the school, which have their root in, and are connected with the general system of law, and which impose lasting obligations or lasting duties on all citizens, or on a particular class of these.

It is in this spirit that His Majesty, the King, has caused the present draft of a law to be prepared.

As the entire draft relates to the external conditions of the popular schools, it has been considered proper that it should determine the object and character of the schools, as also the position which they are to hold.

The popular schools, which, in addition to attending to the religious and moral education of the children, is to impart the elements of knowledge, are public institutions, inasmuch as they are the means of conveying that amount of general knowledge and skill which in the interests of the State, it is considered necessary that every citizen should possess, and as they constitute the lowest step in the common organism of the public educational institutions, the organization, conduct, and control of which constitute an important branch of Governmental activity.

With reference to the district for which the popular schools is specially designed, to the interests which it more particularly serves, and to the means by which it is supported, it belongs to the category of communal institutions, as has already been declared by the law of 10th November, 1861, Article I of which determines the obligations of the communes with respect to the dotation of schools.

In order that the education which is considered necessary for all citizens, may be obtainable by each individual, popular schools must be

instituted in sufficient number all through the country, and in order to insure that the education be really obtained by each individual, positive regulations for attendance in the schools must be prescribed.

In consideration of the question of rights connected with the above two points, it has been deemed necessary that the draft should regulate, by whom and in what manner, the popular schools are to be erected, and on whom devolves the duty of providing the necessary funds, also the extent and the duration of the general obligation to attend the schools, and the circumstances private (instruction, or attendance in private schools) which exempt from this obligation, or which justify a modification in the application of the general rule (instruction given to children employed in factories or other great works).

An essential condition for the prosperity of a school system is the existence of a staff of competent teachers, who, not only possess the culture and capacity required, but who shall as to their legal status and material position, be so placed that being relieved from constant anxiety as to the subsistence of their families they may devote themselves to their calling with cheerfulness and zeal.

For the formarion of such a staff of teachers measures have already been taken by the Government, the question as to which are the best means of educating able teachers, being one that must be settled from the point of view of science and art, and which is, therefore, not suited for regulation by law.

Consequently, up to the present time all rules concerning not only the education of teachers, but also concerning such special culture as is required for every other public calling, have always been considered and treated as being questions depending on the administration.

On the other hand the determination of the position of the teachers, both in relation to the public and to the commune, the duties of their office, their appointment, their removal, and their dismissal, being matters which touch closely their legal interests, the necessary regulations respecting these points have been adopted into the draft, the improvement of the material condition of the teachers, being specially held in view, as constituting the most effective means to secure for the profession the men best suited for it.

* * * * * * *

The material existence of the teacher cannot be said to be secured unless provision be made for him in case illness or old age should render him unable to fulfil his duties.

Such provision for schoolmasters incapacitated by no fault of their own, has already been made by the school dotation law of the 10th November, 1861, in as far as it created societies for the support of incapacitated schoolmasters, and organized them as district or provincial (*Kreis*) institutions, enjoying proportionate subsidies from the State, and to which all schoolmasters in actual employment were bound to belong. The draft has adopted, with some modifications, this really useful institution, and has, in conformity with the generally expressed wishes of the teaching class, and with the necessities that have arisen, extended the institution so as to embrace non-professional (*unständigen*) masters, and lay-female teachers also.

But it is equally essential in order to secure the material well-being of the teacher, that some provisign should be made for his wife and children in case of his death, as he cannot be expected to fulfil his duties with entire cheerfulness and zeal, when he is oppressed by the consciousness that at his death his family will be exposed to misery and want.

This subject, which has hitherto not been sufficiently considered,

and which was not either taken into account in the school dotation law of 1861, has been included in the present draft.

The proposed arrangements are based on the associations for providing pensions for schoolmasters, their widows, and orphans, already existing in the several districts (*Kreise*), these societies being erected into legal district institutions, and receiving subsidies from the State, in like manner, as the institutions for pensioning incapacitated schoolmasters, care being taken that in every case the widows and orphans shall receive suitable maintenance.

One of the most important matters connected with the popular schools is the institution of a system of regular direction and superintendence, as even the best laws and regulations can only be effective when care is taken that they be properly observed and carried out.

* * * * * *

As a matter of principle, and as a general rule, the direction and superintendence of the popular school system devolves upon the Central Government of the State, because to provide for the moral and intellectual education of the people is one of the most important duties of the State in modern times, and because to it belong the organization and classification of the system of instruction into higher, middle, and elementary instruction, and the establishment of suitable means for carrying it into effect.

To the church, as such, belongs, in accordance with the object for which it is instituted, only the direction and superintendence of the religious instruction of the people.

This view is entirely in harmony with the existing legislation in Bavaria. Already, by the law of 29th October, 1806, organizing the various ministerial Departments, and which was confirmed by the Constitutional edict of 1st May, 1806, the right of directing and superintending all matters and institutions connected with moral and intellectual culture, such as national education, schools, colleges, and universities, were vested in the Ministry of the Interior. And by the organic edict of 15th September, 1808, a special section for public instruction was created in the ministry.

* * * * * *

But, at the same time, that it is admitted that the Central Government has an undeniable right to direct the popular schools, and that it must, therefore, also have the right of a free choice of the agents to be employed in carrying out its views; it must also be allowed that justice and fairness demand that the persons more immediately interested in the schools should likewise have some share in their direction and superintendence.

These persons are represented by the communes, for whose benefit and at whose expense more especially the school is erected and maintained; by the church, inasmuch as the religious instruction and education which come within its office are also comprehended in the popular school; by the family, which, in consequence of the obligation to attend school imposed by the State, is bound to send its children to the popular school for instruction and education; and finally, by the teachers, who labour immediately in the schools, and on whom these depend for weal or for woe. In determining the composition of the local school authorities by a modification of the existing arrangements, the draft endeavours to satisfy the claims of all these parties, and particularly to define clearly the position to be held by the church.

On the other hand, perfect independence is secured to the church with respect to those matters (religious instruction and religious and moral education) which come within her special sphere.

The purely technical direction of the popular school can only be entrusted to those who possess the special culture and experience required for the office, and as the local school authorities cannot be supposed to be thus qualified, they are excluded from this branch of activity, in connection with the schools, which is given into the hands of district (*Bezirk*) superintendents.

As regards the appointment of these superintendents, the draft lays it down as a principle that they must possess the necessary knowledge and capacity, and must therefore be chosen from among the ablest schoolmen in the country, whether they be clergymen or laymen. They are to be appointed by the Government, and must hold no other office.

Extracts from 1st Division.

Art. 2. The essential subjects of instruction in the schools are: religion, the German language, and reading, writing, and exercises in composition, arithmetic, a rudimentary knowledge of geography, history, natural history, and natural science, singing (religious and popular), and elementary exercises in drawing.

To this must be added, for boys, gymnastics and other bodily exercises; and for girls, needlework and other female employments.

* * * * * *

With respect to instruction in the popular schools, it must be borne in mind that, to impart knowledge of a number of subjects is far less important than to effect a thorough development of the mental faculties, and to teach the necessary subjects in such a manner as to avoid the habit of mere mechanical repetition.

Art. 4. The popular schools are divided into week-day schools and perfecting schools (Fortbildungs Schule).

The object of the latter is to afford an opportunity not only for repeating what has been learnt in the lower school, but for further development, and for applying the acquired knowledge to the needs of practical life.

The perfecting school is to be open on Sundays and holidays, and for boys during the winter months some days in the week, according to the arrangements of the school authorities.

* * * *

The industrial and agricultural perfecting schools which have recently, by the encouragement of the Government, been introduced into several communes, cannot be considered as sufficient, because they are mostly special schools, and depend upon free private activity, and because the attendance in these institutions is voluntary.

Perfecting schools, such as those here indicated, have existed for several years in the kingdom of Wurtemberg, and have proved successful. The introduction of the schools is indeed left to the communes, but where they are in existence, the children may be compelled to attend them instead of the ordinary Sunday schools.

In the kingdom of Prussia also perfecting schools have been introduced wherever there has been a special local reason for doing so. But neither their institution nor attendance in them is obligatory.

Extracts from 2nd Division.

Art. 5. Throughout the kingdom popular schools shall be erected in sufficient number.

The establishment of new schools, the breaking up of old ones, the formation and changes of school communities and school districts, shall

be effected according to the regulations herein laid down and by the district authorities concerned.

Art. 6. The public popular schools are in the first place communal institutions.

Each political commune must, therefore, as a rule have one, and if need be, several schools.

In exceptional cases, when there are good reasons for it, as, for instance, when the number of scholars in the individual communes is very small, or the pecuniary means insufficient, several communes may be allowed to keep one school between them.

In case of great distance from, or bad roads leading to, the communal school, children belonging to one school may, by arrangement with the authorities concerned, be allowed to attend the school of another commune more conveniently situated, or, if this be not feasible, a new school may be erected, and the children may be separated from the school community to which they until then belonged. As a general rule a new school shall be founded when, in a commune or a locality, or in several communes or localities together within the circumference of a league (*Stunde*) there are proved to be, on an average of five years, twenty-five children bound to attend school, who are obliged to do so at a distance of one geometrical league (*eine geometrische Stunde*).

Extracts from 3rd Division.

Art. 8. As a rule, one master must not instruct more than 80 children.

But if the instruction be given by several masters in separate classes, then the number of scholars subject to one master may amount to 100.

If, on an average of five years, the number of pupils in a school exceed the normal number, an additional teacher may be appointed.

This does not exclude the appointment of assistant teachers when required, or the removal of scholars from one school community into another when expedient.

To render the instruction effective, it is essential that the number of scholars under one teacher should not be too great.

In the School Dotation Law of 10th November, 1861, the maximum number of scholars under one teacher was fixed at 100, without difference as to school. But this number is evidently too high, more particularly in cases where all the scholars do not belong to the same yearly course; but, as is so often the case in the country, there are scholars belonging to all the different courses.

Under such circumstances the educational influence of the master on each individual child must be limited, the effectiveness of discipline must be impaired, and the strength and health of the teacher must suffer.

In order to enable the school to take a place corresponding to the demands made upon it in the present day, and to impart true culture, not mere mechanical instruction, a certain reduction in the number of scholars under one master is urgent.

* * * *

In Wurtemberg, by the law of 6th November, 1858, the maximum number of scholars under one master is fixed at 90; in Sachsen Gotha, by the law of 1st July, 1863, at 80.

In Wurtemberg, however, the number may be increased to 120, if the lessons be given in separate divisions and at separate hours, and even to 130 if there be more than one teacher.

In Baden the rule is that no more than 120 children must be permanently under one teacher.

In Prussia, according to the fundamental principles of 3rd October, 1854, for the foundation of evangelical elementary schools with one class only, the normal maximum number of scholars fixed for each school is 80. When the number exceeds 80 the school must temporarily be divided into two classes, until the Government appoints a second teacher.

Extracts from 4th Division.

Art. 13. Parents or guardians are bound not to leave the children under their care without the instruction which is given in the popular schools.

They are bound to send them to the popular schools or to some private establishment where the same amount of instruction is given.

Those only who attend higher educational institutions are exempt from the obligation to avail themselves of the popular schools, or to substitute corresponding private teaching for the instruction given there.

These regulations extend likewise to foreign children living in Bavaria, whose parents belong to the States with which an agreement relative to this point exists.

Art. 14. The obligation to attend school begins, for children of both sexes, with the sixth year, and regularly extends over a period of 10 years, seven of which are to be given to the popular school and three to the perfecting school (fortbildungs schule).

Every pupil is at liberty to continue attendance at either of these schools during one year after the expiration of the legally appointed time.

Pupils who at the expiration of the legal school period prove themselves deficient in instruction, may, by the district school inspector, be ordered to prolong their attendance at school during one year more.

According to the school regulations issued in 1856, the period of obligatory attendance at school, extending over 12 years, the first six of which were given to the week-day school, and the other six to the Sunday school. This arrangement was not, however, found satisfactory, the time given to the week-day school being too short, and that given to Sunday school (which only afforded the means of repeating what had been learnt in the week-day school), too long; and a change was in consequence almost immediately demanded, and will be effected by the present law.

Art. 15. During the period of obligatory attendance in the perfecting school, the children are also bound to attend the public lessons in religion.

Religious instruction, which forms an essential part of the entire school course, is given separately to the pupils who have ceased to attend the week-day schools.

Art. 17. In school communities, comprising persons of various religious denominations, and in which there is a popular school for the members of the confession which is in a minority, the children belonging to this confession must attend their own particular school.

Where there is only *one* school answering to the creed of the majority, the members of the religious society which is in the minority, may, when an addition to the number of teachers becomes necessary, demand that the children be divided according to their creeds, and that a teacher of the religion of the minority be appointed, in case the number of children belonging to it who attend school contribute not less than one-third of the total number of children.

But if there be no popular school appropriated to the confession of the minority, or there be no reason for subdividing the school of the majority in the manner indicated above, then the children of the minority are bound to attend the school of the majority, but need not take part in the religious instruction.

The members of the confessions in question may, however, if they apply for permission, be allowed to form a union with some neighbouring school of the same confession, or they may either alone, or in conjunction with co-religionists in neighbouring localities, establish a separate school for themselves, on condition of providing the necessary funds.

In each of these cases they are exempted from payment of rates for the regular school in their commune.

Art. 18. The children of Israelites, and of other religious bodies not included among the public ecclesiastical societies, are also bound to attend the popular schools of the communes to which they belong, and to take part in the whole course of instruction, with exception of the religious instruction. But it is open to these various religious bodies to erect separate schools for their children, on condition of their providing the legally prescribed funds for its support.

In this case the exemption mentioned in Art. 17 likewise applies.

Art. 19. The parents or guardians of children are held responsible for their proper attendance at school.

If a child remains away from school without due cause, a fine of from 3 to 12 kreuzers (*1d. to 4d.*) for each day of absence is to be imposed by the local school authorities, and payment is to be levied, and, if necessary, forced by the same legal means as are employed in levying and enforcing payment of other communal taxes.

The first time this punishment is inflicted the local school authorities must warn the persons concerned against further transgressions; but if the offence be repeated, police measures in accordance with Art. 107, § 1, of the criminal police law, are to be taken immediately.

Art. 20. Pupils of the perfecting schools who absent themselves from school, are, for the first offence of the kind, to be reprimanded by the local school authorities, but each subsequent absence renders them liable to police proceedings in accordance with Art. 107, § 2, of the police law.

Nothing is so important with respect to the influence and success of school education as regular attendance. There is, therefore, every reason to insist strongly on this point, and to inflict due punishment for unnecessary absence from school.

The regulations hitherto in force on this subject, and contained in the Royal Decree of 28th June, 1862, have not proved sufficient.

The first fine of from 2 to 6 kreuzer, to be imposed by the local school authorities has been found too low to be effective, and the fine is, therefore, in the present draft fixed at from 3 to 12 kreuzer.

But the mode of levying and enforcing the fines also required improvement. Up to the present moment all proceedings with regard to the collection of the school fees and school fines devolve upon the communal authorities, and when their means of enforcing payment are exhausted, on the police authorities of the district. But in practice these arrangements have been found to be beset with a great many difficulties, and especially to lead to great delays.

This present draft, therefore, proposes to introduce the more simple mode of proceeding laid down in Article 53 of the draft of the new communal regulations for recovering communal rates in arrears.

Art. 21. Parents and guardians of children who attend the popular

schools, are bound to provide them with the proper books and other necessary materials.

If they neglect to do this after having been warned by the local school authorities, the latter are empowered to request that the things be procured by the communal authorities concerned, at the expense of the parents. The outlay is, then, to be recovered according to the usual rules for levying communal rates.

Children of poor parents are to be provided, with books and other school materials in accordance with the regulations of the poor law.

5th Division.

Art. 22. No instruction shall be considered as a substitute for attendance in the popular schools, except it be given by a certificated teacher, or received in a duly authorized private educational establishment.

The district school authorities have to decide as to whether the private instruction received is sufficient.

Art. 24. The parents and guardians of children who do not attend the popular schools are exempt from payment of the school fee, but not of any other school dues.

Art. 25. When a child is, for disciplinary reasons, excluded for any length of time from the popular school, the necessary private instruction must be provided for it by parents or guardians, or in case of incapacity from poverty, by the guardians of the poor.

Art. 26. The regulations respecting the duration of obligatory school attendance (Art. 14), apply also to children receiving private instruction.

6th Division.

Art. 27. Children bound to attend the week-day school must not be employed in factories or other great works until they have completed their tenth year, and have acquired the amount of school knowledge considered sufficient for that age, and not unless their health and bodily development is such as to suit them for this employment.

The district school authorities are empowered to decide these points.

Art. 28. The completion of the week-day school instruction of these children is to be effected, either by their attending the school three hours every day, at the time they can best be spared from their employment, or by their being instructed in special factory schools.

Special factory schools, which are supported by the owners of the works, must be organized in the same way as the public communal schools, and the teachers appointed must be duly certificated.

The number of pupils in these schools must not exceed 60, and the instruction must not begin before six in the morning, and not be carried on after six in the evening.

Art. 29. After the week-day instruction has been completed, children employed in factories or other great works, must either attend the local perfecting school and the public lessons in religion, or they must receive corresponding intruction in the factory school.

Art. 30. The regulations as to duration of obligatory school attendance apply to these children also

If the proprietor of the factory or the works, or his representatives render themselves guilty of any contravention of the above regulations, they shall be proceeded against according Art. 213 of the Criminal Police Law.

7th Division.

Art. 33. * * * For the instruction of children in the country in gardening and the cultivation of vegetables and fruit; the existing school gardens are to be maintained, and, where there are none, land is to be allotted for the purpose.

Art. 34. The entire expenditure connected with the public popular schools shall, except in cases where private parties have incurred obligations as to the matter, or where the present law determines differently with regard to certain items of expenditure, be in the first instance defrayed by certain institutions and foundations erected for educational purposes, out of special revenues intended for these purposes, or out of collateral funds arising from permanent sources in connection with the school's service. If these means do not suffice, the remainder must be made up by the school community.

Art. 35. To the special revenues for school purposes belong, in addition to what may be given by private individuals and corporations, the school fees, and the money raised from fines.

Art. 36. The school fee is to be levied in all cases if, and inasmuch as there are no other sources whence a corresponding revenue may be drawn, and it is to be paid for each child by its parents or guardians.

The children and orphans of schoolmasters are excepted.

Children of indigent parents may, by the school authorities of their native place, be relieved in whole or in part from payment of the school fee.

In such cases, corresponding compensation must be made to the school out of the communal funds, or the poor funds, concerned.

Art. 37. The school fee in the week-day schools amounts to 24 kreuzer (8*d.*) per quarter, the fee in the perfecting school to 12 kreuzer per quarter.

In cases where a higher fee has not already been introduced, it may be raised by a resolution of the school committee, sanctioned by the Government authorities concerned, to the double of its present amount at the highest.

The school money must be collected by the school cashier; and, in cases of arrears, payment must be enforced by the legal means provided for the enforcement of payment of arrears of communal rates.

Art. 39. By resolution of the communal authorities concerned, it may be determined that the communal exchequer shall take upon itself the whole or part of the school fees, according as the yearly surplus of the communal revenues may permit of this without augmentation of rates.

The substitution of a communal rate for the school fee is not permitted.

The reason for this is, that such a subtitution would violate the principle on which the payment of the school fee is based, and would change the nature of the latter from being a primary provision for the necessities of the school into a mere subsidiary fund.

Art. 40. Those revenues of the schools which are derived from private gifts or from foundations and dotations, specially designed for the salaries of teachers, must not be applied to any other purposes of the school.

The school fees and the use of the communal lands (*Gründe*), which, according to § 3, Art. 23, of the new communal law, have been allotted to the schools, shall form part of the income of the teachers.

These provisions are meant to prevent arbitrary employment of the school revenues by the communes.

Art. 41. The amount of expenditure for the schools which cannot be covered by the ordinary revenues of the same, and which must, in consequence, be defrayed by the school community, is to be raised in accordance with the general legal regulations for defraying communal expenditure, and consequently, in default of other means, must be covered by communal rates, &c.

Art. 42. If the school community comprise within it several political communes, or parts of such, the amount to be raised for the school shall be distributed among the individual sections of the school community by the representatives of the latter, in proportion to the entire amount of the direct taxes levied in each of the political communes comprised in the school community.

Art. 44. All the revenues of the schools, with exception of the produce, &c., of the land cultivated by the teachers, flow into the school treasury, which shall be administered by a school treasurer, elected by the school committee, from among its own members.

By this treasury, the current expenses of the school shall be defrayed, and likewise the salaries of the teachers.

No. 17.

Mr. Ford to Lord Stanley.—(Received January 19.)

My Lord, *Washington, January 7, 1868.*

With reference to our Lordship's despatch of the 17th of July last, relating to technical or industrial education in the United States, I have the honour to inform your Lordship, that although the subject is one to which the intention of the Commissioners on Education in this country, is specially directed, there do not appear to exist at present any schools exclusively devoted to such branches of education.

Mr. Barnard, with whom I have been in correspondence on this subject, has addressed to me the note, copy of which is herein inclosed, and I trust I may soon be enabled to forward to your Lordship the Report he has promised me on colleges of agriculture and mechanic arts.

I have, &c.,
FRANCIS CLARE FORD.

Inclosure in No. 17.

Mr. Barnard to Mr. Ford.

Department of Education, Washington,
Sir, *November 7th, 1867.*

I have delayed any formal answer to the questions left by you at this office relative to "technical or industrial education" in the several States, in the hope that I might be able to send you a report, for which I am still gathering material, on the "colleges of agriculture and the mechanic arts," based on the United States land grants (in 1862) of 9,150,000 acres of public land, in aid of this class of schools. As this report will, it is hoped, be ready for presentation in January next, and will contain an account of all institutions of this class, I will not attempt any reply in detail, remarking that we have but little to show in the way of organization of instruction in this department of educa-

tion. In some States the universal elementary education, secured through public schools, has enabled our youth to enter the field and workshop, with minds wide awake, and capable of acquiring the details of a trade or business with great rapidity; and the wants of a new and growing country have fostered great versatility; but our workmen are deficient in that taste and artistic skill, which well-devised schemes of industrial education would doubtless impart.

There is much attention now given to this subject, and we are looking with interest to the results of this kind of instruction in other countries.

Our experience, such as it is, I shall be able to give you soon. In the meantime I will forward herewith the legislation of the several States on the subject of colleges of agriculture, mining, and mechanical arts.

Very respectfully, &c.
(Signed) HENRY BARNARD,
United States' Commissioner of Education.

No. 20.

Report by Mr. Strachey, Her Majesty's Chargé d'Affaires at Copenhagen, on Technical Education in Denmark.

As the prohibitive and protective systems have failed to make Denmark a manufacturing country, and as no industrial processes are carried on here with signal success, the statistics of Danish technical education are not likely to be interesting or suggestive. Special technical schools, of the species known in France and Germany, do not exist in this kingdom. That is to say, there are no Danish counterparts of the watchmakers' school at Besançon, the dyer's school at Rouen, the Berlin school of embroidery, and others that could be named.

The technical institution of Copenhagen is, unless I mistake, analagous in character and scope to the Italian "Scuole delle Arti e Mestieri." Instruction in industrial arts occupies, however, a very small place in the programme of the Copenhagen School, which gives more facilities to students in drawing and elementary mathematics than to workmen anxious to acquire the most approved methods of technical manual procedure. The "technical institution" is the only establishment of the kind existing here. The small branch of it devoted to metal work dates from the year of the second British expedition against Copenhagen. In 1843, private persons set up the so-called "technical institution," which, thanks to the activity of a scene-painter and a grocer, was able to procure house-room on advantageous terms, finding itself in 1850, the possessor, from all sources, of property valued at 2,500*l.* sterling. At first the institution received a yearly grant of 55*l.* from the Danish Government, besides about 125*l.* per annum from educational funds; but its various revenues were inadequate for a liberal development of the objects contemplated by its founders. The industrial population of the capital appear to have been indifferent to the fortunes of the society—the subscribers of this class not having averaged above 120 yearly, although the subscription is only 2 Danish dollars, or 4*s.* 6*d.*

In 1856, the whole subject of technical education was referred to a committee, on whose recommendation the institution was remodelled, and amalgamated with the metal workers' society. The Government contribution was raised to 2,000 dollars per annum, and the

trustees of the "Reiersen fund" presented the society with 1,000 dollars; the management was entrusted to five members, three to be elected by the society, two by the Government; the yearly budget and educational programme to be submitted for Government approval.

According to the budgets for the last scholastic year, the income of the institution was as follows:—

	Rix-dollars.
1. Government contributions	2,000
2. From trustees of "Reiersen Fund"	1,100
3. „ "Classen do."	300
4. From Academy of Fine Arts	620
5 From Jews' Reward Society	50
6. Subscriptions from members	240
7. Interest on capital of 21,500 rix-dollars ..	860
8. Pupils' fees	2,800
Total	7,970
Or	£880

All persons can obtain admittance to the institution, unless want of room prevents, who can show that they are of the male sex, that they can write well, spell decently, and can perform a sum in rule of three. Annexed is the educational programme for the last year. A document of this kind may not be very agreeable reading, but whoever masters its contents will have a sufficiently complete notion of the nature of the instruction given in the "technical institution," of the subjects, terms, hours, of the connection of each class with the others.

The classes are in number 30. They are in 8 divisions, thus:—

1. Preparatory drawing.
2. Ornamental ditto, and modelling.
3. Architectural: technical and preparatory (day).
4. Technical, various.
5. Technical, metal work.
6. Mathematics (evening).
7. Scientific lectures.
8. Supplementary, for drawing.

How these 8 divisions are organized will now be described in detail.

1.—*Preparatory Drawing.*

A. Classes for copying outlines:

2 for young persons = 6 hours weekly .. } for 2 quarters.
2 for older persons = 8 and 12 ditto .. }

B. Geometrical drawing on plane and rectangular projection:

2 classes for young persons = 6 hours weekly } for 2 quarters.
1 class for older persons = 8 ditto }

Pupils who have gone through the above-named classes, or passed a satisfactory examination in their subjects, may, at option, join Class B. B., or one of the special classes.

B. B. Preparatory class for drawing ornaments: sketching from large plain outlines:

1 class .. 12 hours weekly .. for 2 quarters.

2.—*Ornamental and Modelling.*

C. First ornamental: for workmen who wish to cultivate a feeling for form. Drawing ornaments from copies, shaded, and from plaster casts in outline:

1 class .. 12 hours weekly .. for 2 quarters.

Pupils proceed at option to D or F.

D. 1. Perspective: sketching from solid geometrical figures and vessels, with shading:

Time, the same.

D. 2. Perspective, and ornamental:

Time, the same.

These classes lead into—

E. Second ornamental: drawing, shaded, from plaster ornaments: leads at option to Academy of Arts elementary class:

Time, the same.

F. Clay modelling: from drawings, models, and natural objects:

Time, the same.

From this class, pupils who have passed an examination in drawing outlines from casts, in perspective and sketching from models, may join the Academy of Arts, or,

G. Wax modelling:

Time .. 3 hours weekly .. for 7 months.

3.—*Architectural (Day).*

H. 1. Day drawing class = geometrical projection, and theory of shadows:

Daily from December 1 to March 31: 9—2.

H. 2. Preparatory, for technical architectural drawing:

Daily, as the last.

Pupils must be able to draw on geometrical projection, and attend the mathematical classes R. 1, and R. 2, or be examined in their subjects.

H. 3. Technical construction of buildings. Practical execution of parts of detail in buildings, with calculation of dimensions and forces. Study of elementary mechanics, strength of materials, calculation of centre of gravity, with applications:

Time, as the preceding.

Pupils must have passed H. 2, or been examined, and also show competence in arithmetic and elementary geometry. They must further follow H. 4, or H. 5, or be examined in their subjects.

H. 4. Mathematics. Equations of the first and second order; logarithms, progressions:

Time, as the last.

Pupils must understand elementary arithmetic and geometry.

H. 5. Mathematics. Trigonometry, stereometry, and comic sections: Time and limitations like the last, with necessity of knowing its subjects.

H. 6. Evening drawing class, for carpenters, masons, stonecutters, &c.:

8 hours weekly.

4.—*Technical, various.*

I. Professional drawing, for joiners, turners, chairmakers, &c.

8 hours weekly.

K. 1, and K. 2. Ditto for smiths, mechanics, coachmakers, gun and instrument makers, shipwrights, &c.

Each class (2) 6 hours weekly, for 2 quarters.

L. Drawing, for tin and coppersmiths, braziers, goldsmiths, &c.:

8 hours weekly.

5.—*Technical, Metal Work.*

N. Turning: 12 lathes:

Each pupil has one evening's practice a-week for 7 months (October to May): 72 pupils received.

P. Engraving:

Time, as the last: 50 pupils.

Q. Embossing and chiselling:

Time, the same.

The metal-workers may follow the wax class (see G above).

6.—*Mathematics (Evening).*

R. 1. Elementary arithmetic:

3 days weekly .. 2 hours .. for 2 quarters.

R. 2. Elementary planimetry and stereometry, with applications:

Time, as the last.

For pupils wishing to join the architectural school of the Academy of Arts, the classes are preparatory for H. 4 and H. 5 (see above).

7.—*Scientific Lectures.*

From December 1 to March 31, twice a week.

Series. 1. Principles of mechanical physics.

Series. 2. Theory of magnetism and electricity.

8.—*Supplementary, for Drawing.*

1 upper class .. 2 hours each evening.

2 lower classes .. ditto.

From April 1 to June 30.

In the divisions 1 and 2, the charge for instruction is 2 rix-dollars 3 marks, about 6*s.*, a quarter, except in the wax class, G, where 2 rix-dollars, 4*s.* 6*d.*, is charged for the winter.

In classes H. 1, H. 2, H. 3, for four months, 10 rix-dollars, or 1*l.* 2*s.* 6*d.*

In H. 4, H. 5, half that price for four months.

In classes from H. 6 to K. 2, per quarter, 2 rix-dollars 3 marks.

In N. P. Q. (metallic), for one evening weekly (two hours allowed) during the winter, 1 rix-dollar per class; if more than one class is followed, for each 2 marks (9*d.*) extra. An apprentice, master, or other, pay half as much again.

In R. 1, R. 2, for three months, 2 rix-dollars.

The time is generally at night.

The instruction given, as may be seen from this programme, is adapted to masters, overlookers, and workmen, but the students belong, in practice, almost exclusively to the last-named class.

In recent years the average number of students has been about 500; in the scholastic year 1864–5, there were 553; in 1865–6, 618. Of these last, 79 received free admissions, 19 passed to the Academy of Fine Arts, 15 passed the mathematical examinations of that institution. A mechanic and a goldsmith were presented with 100 rix-dollars (11*l.*) each, for travelling-money. The Society does not often make grants of this kind, as the so-called "Reiersen's fund," above mentioned gives assistance to workmen, who wish to go abroad for professional objects.

The general school manager appoints the teacher according to his private opinion of their probable efficiency; he does not follow any specific system of choice.

The Executive Committee of the institution publishes an annual report, giving the balance-sheet for the year, the educational programme, and certain statistics as to the attendance of pupils, prizes given, and the like. The reports are in Danish, and they furnish little or no infor-

mation of a general or speculative character on the progress and prospects of Danish industrial intelligence.

What has been now said should, perhaps, be a sufficient answer to the official questions from 1 to 10 inclusive.

Question 11 runs:—

"What advantage, if any, has resulted from these schools, &c., in promoting or extending the manufactures with which they are connected?"

Question 12 is:—

"What is the opinion prevalent among the industrial classes, whether employers or employed, with regard to the working and effect of these schools?"

As, from want of professional knowledge, opportunities of cross-examination, and other obvious personal deficiencies, I could only answer these questions with mere conjectures and impressions, I prefer to leave them without reply. This should be the less regretted, as No. 11 could hardly be extensively investigated except by a local commission, while No. 12 may safely be described as opening ground on which foreign employers and workmen do not usually form deliberate opinions.

Copenhagen, February 1, 1868. G. STRACHEY.

No. 21.

Vice-Admiral Harris to Lord Stanley.

My Lord, *The Hague, February* 21, 1868.

As no Secretary's report was sent home at the close of last year from this Legation, owing to the absence of Her Majesty's First Secretary, I desired Mr. Thurlow to draw up a report upon the working of the Dutch Primary Instruction Law of the year 1857, and have now the honour to inclose it.

Mr. Matthew Arnold, in his able report on Education in Holland, laid before Parliament in the year 1861, states that the law of 1857 had been too short a time in operation to pronounce on its working. A sufficient period has now elapsed to test it, and in detailing the results Mr. Thurlow has not been satisfied with merely quoting statistics, but has also obtained valuable information from reliable sources. He has added a full translation of the law of 1857, which does not appear in Mr. Arnold's report.

I have, &c.
(Signed) E. A. J. HARRIS.

Inclosure in No. 21.

Report by Mr. Thurlow, Second Secretary at the Hague, on Primary Education in the Netherlands.

MR. MATTHEW ARNOLD, in his admirable report of 1860, on popular education in Holland, observes that it was at that date too soon to pronounce on the working of the law of 1857, for primary instruction, which had been but two years in operation. Now, however, it may be held that sufficient time has elapsed to test the efficacy of this law, and an opportunity for so doing has been afforded by the recent submission to the States-General of the Government Report for 1865–6, on the statistics and condition of education in the Netherlands. This document is very voluminous, and the valuable information which it

contains may probably be best rendered in the condensed tabular shape adopted in this report.

The law of 1857, is of so detailed, and at the same time so practical a character, that it affords the best running commentary on the statistics now furnished by the Netherlands Government. Under these circumstances, a translation of it, *in extenso*, is herewith given :—

Law for Primary Instruction, 13th August, 1857.

To all, &c.

Having considered Article 194 of the Constitution, which prescribes, that rules for the organization of public education, with a due regard to everybody's religious principles, should be made by law, that the Government is bound to provide everywhere primary public education, and that everybody is free to teach, under the control of Government; Government certificates being required of a master's scientific acquirements and character, that so far as primary and middle education are concerned, this must be settled by law, that it is necessary, pending legislation on middle and higher education, to give effect to the following regulations for primary education.

We, &c., &c., do decree:

CHAPTER I.—*General Regulations.*

ARTICLE I. Primary instruction is divided into primary and extended primary instruction.

Primary instruction includes instruction in :—

a. Reading.
b. Writing.
c. Arithmetic.
d. The rudiments of syntax.
e. Rudiments of Dutch.
f. Of geography.
g. Of history.
h. Of natural history.
i. Singing.

Extended primary instruction includes instruction in :

k. The rudiments of modern languages.
l. Of science.
m. Of agriculture.
n. Of gymnastics.
o. Of drawing.
p. Of female handiwork.

II. Primary instruction is given in schools, and in the houses of the parents or guardians of the children.

The first is school, the second home instruction.

Instruction of children in at most three of the above branches is considered home instruction.

III. Primary schools are divided into public and private schools :

Public schools are those established and supported by the communes, the provinces, and the kingdom, separately or collectively; the rest are private schools.

Private schools may be subsidized by the communes or the provinces, under such provisions as the communal or provincial authorities may deem necessary.

Schools thus subsidized are open to all children without distinction of creed. The 1st and 2nd paragraphs of Article 23 are applicable to these schools.

IV. No school instruction shall be given in schools declared by the sub-inspectors to be detrimental to the health, or insufficient in size for the number of children attending school.

If their decision is not concurred in, the Provincial States Duputies shall order a second independent enquiry.

An appeal, either from the decision of the sub-inspector, or from that of the Provincial States Deputies, must be made within fourteen days, counting from the day on which the decision was made known to those concerned.

All those are empowered to make appeal to whose prejudice the decision is given; that is to say, the parents and guardians of the school-going children, and the school inspector, shall submit to the decision of the Provincial States Deputies.

Pending the decision, instruction may be continued in the school objected to.

V. School instruction is given by instructors and assistant instructors, instructresses and assistant instructresses, and pupil teachers, male and female.

Pupil teachers are those who, not having attained the age at which they are competent to pass an examination as assistant instructors or instructresses, help in school instruction.

Having attained such an age, they may continue to act as pupil teachers, during the time that may elapse before they can be admitted to examination.

Should pupil-teachers have passed the examination notified in the 2nd and 3rd paragraphs unfavourably, or from reasons, subject to the control of the inspector, have been prevented from attending the examination, they may act as pupil-teachers until the next examination.

VI. No one may give primary instruction who is not in possession of the certificates of scientific acquirements and character required by this law.

Foreigners also require our approval.

VII. The regulations in the above Article are not applicable to:

a. Pupil-teachers receiving instruction in the school in which they act.

b. Those who give instruction exclusively in one branch of primary instruction.

c. Those who make no profession of primary instruction, and being willing to give such instruction without pecuniary remuneration, solicit our permission so to do.

d. Candidates and Doctors of Arts and Sciences, empowered by their academical grades to give instruction in one or any of the branches mentioned in Article I.

VIII. Those giving primary instruction without being empowered so to do, or in contravention of paragraph 1 of Article IV. shall be punished, for the first offence, by a fine of from 25 to 50 florins; for the second offence, by a fine of from 50 to 100 florins, and imprisonment of from 8 to 14 days, separately or collectively; and on repetition of the offence, by imprisonment of from a month to a year's duration.

Those giving instruction beyond the limits of their province are liable to half of the above penalties. Assistant instructors, placed at the head of a school, for a period not exceeding six months, are excepted.

Article 463 of the Penal Code, and Article 20 of the Law of June 29, 1854, are applicable to the above.

IX. On each imposition of a fine it shall be notified to the delinquent that if he neglect to pay the fine and costs within two months

of the notification of the sentence, the penalty shall be altered to imprisonment of not more than 14 days, if more than 50 florins, and not more than 7 days if less than 50 florins, be the fine imposed.

X. Besides the cases above stated, those are forbidden to give instruction in primary schools who have been found guilty of:

a. Crime.

b. Theft, robbery, perjury, breach of confidence, or immorality.

XI. Those who have lost their qualifications for teaching cannot recover them.

In the cases mentioned in Article XXII, paragraph 7, and Article XXXIX, they may be restored by us.

XII. There shall be at least two Government schools for the training of teachers, and instructions of the same description shall be provided in the best primary schools at Government expense. The training of instructors in the primary schools shall be encouraged as much as possible by Government.

XIII. From every decision taken by the Provincial States' Deputies in virtue of this law, appeal may be made to us.

XIV. The regulations in this law respecting instructors are applicable to instructresses, so far as their cases are analagous.

XV. This law is not applicable:—

a. To those who give instruction exclusively in one of the branches, *i*, *o*, *n*, or *p*, of Article I, and to the schools for such use.

b. To military instructors, and the instruction given by them to soldiers.

Chapter II.—*Public Instruction.*

Part 1.—*Of Schools.*

XVI. In each commune, primary instruction shall be given in a number of schools sufficient for the population, accessible to all children, without distinction of creed.

This instruction must comprise, at the least, the branches mentioned under *a* to *i* of Article I; where necessity exists for extending this instruction, and where such extension is possible, one or all the branches mentioned in Article I from *k* to *p* may be included.

Two or more neighbouring communes may, in accordance with Article CXXI of the Law of June 29, 1851, combine in the establishment and maintenance of schools in common.

XVII. The communal council fixes the number of schools; its decision must be communicated to the Provincial States' Deputies.

Should the Provincial States' Deputies find such number insufficient, they shall command an increase.

If it should appear to us insufficient, we can order an increase.

The extension of instruction, provided for in the second paragraph of Article XVI, is established in the same manner.

Part 2.—*Of Instructors.*

XVIII. Whenever the number of scholars in one school exceeds 70, the principal instructor shall be assisted by a pupil teacher; when more than 100, by an assistant instructor; more than 150, by an assistant instructor and pupil teacher. Above this number, he shall be assisted, for every 50 scholars, by one pupil teacher, and for every 100 scholars by one assistant instructor.

XIX. Each principal inrtructor shall be provided with a free residence, if possible with a garden, besides his salary.

If no free residence can be procured for him, he shall receive a reasonable compensation as house-rent.

Differences between the communal council and the instructor, concerning the amount of such compensation, shall be decided by the Provincial States' Deputies.

For each pupil teacher mentioned in the above Article, the principal instructor shall receive an annual addition of salary.

Each assistant instructor shall receive an annual salary.

The salaries and additions shall be fixed by the communal councils, and approved by the Provincial States' Deputies.

The salary of each principal instructor shall be 400 florins at least; of each assistant instructor, 200 florins at least; the additions shall be 25 florins each at least.

XX. In communes where, on account of their extended area and scattered population, a larger number of schools is required than would otherwise be necessary, an assistant instructor may, with the approval of the Provincial States' Deputies, be placed at the head of each of such schools, with a salary of 200 florins at the least.

XXI. To be appointed a principal or assistant instructor it is necessary to be provided with:—

a. A certificate of qualification to give school instruction.

b. A certificate of good character given by some communal authority of the place where the candidate has resided for the last two years.

XXII. Principal instructors shall be chosen by the communal council, composed of at least three, and at most six, peersons, including the burgomaster and assessors, in concert with the district school inspector, by competitive examination, held by them or under their superintendence, and on examination of the candidates' certificates by the burgomaster and assessors or their representatives, as well as by the local school commission or their representatives. The members of the council are invited to attend the examinations.

Assistant instructors are named by the communal council, composed of three persons, including the burgomaster and assessors, in concert with the principal instructor and the district school inspector.

Principal and assistant instructors can be suspended by the burgomaster and assessors after communicating with the school inspector. The burgomaster and assessors must give an early explanation of their decision to the council.

Principal and assistant inspectors may be discharged by the communal council on the application of the burgomaster, assessors, and district school inspector. Discharge at their own request is granted by the council.

If suspension or discharge is considered necessary by the district school commission or inspector, and the communal council is reluctant or refuses to accord it, such suspension or discharge may be granted by the Provincial States' Deputies.

Suspension may be for a period not exceeding three months, and with enjoyment, or whole or partial loss, of salary during such suspension.

Those accused of scandalous conduct, or of the dispensation of doctrines at variance with morality, or inculcating disobedience to the laws of the land, may be declared by the Provincial States' Deputies to have lost their qualification for giving instruction.

Pupil teachers are appointed and discharged by the principal instructor, with concurrence of the district school inspector.

In cases of suspension, discharge or absence, of the principal or

assistant instructor, the burgomaster and assessors, in so far as the principal instructor is concerned, in concert with the district school inspector, and in so far as the assistant instructor is concerned, in concert with the principal instructor, shall give timely notice for the provision of a substitute. A principal instructor's place must be filled up at the outside in six months.

XXIII. School instruction, besides imparting the above prescribed and useful subjects, shall be made serviceable to the development of the reasoning powers of the children, and their rearing in all Christian and social virtues.

Instructors are prohibited from teaching, from doing or allowing to be done, anything irreconcileable with, or contrary to, the religious opinions of others.

Instruction in religion is entrusted to the various churches. For this purpose the school buildings may be used out of school hours by the scholars attending the school.

XXIV. Principal and assistant instructors are not allowed to fill any office or follow any occupation except with the approval of the Provincial States' Deputies, the burgomaster and assessors. In communes of 3,000 souls and upwards, the consent of the local school commission is also required. In other communes the district school inspector must be consulted.

They are not permitted to engage in trade, nor pursue any profession. This prohibition is applicable to the members of the families of principal and assistant instructors, so far as such trade or profession would be carried on in their houses.

XXV. To principal and assistant instructors pensions are awarded by the State in the following cases:

XXVI. Right to a pension is acquired by honourable discharge at 65 years of age, and on 40 years' service.

In the same way pensions are also awarded after 10 years' service, on account of mental or bodily illness causing unfitness for service: honorable discharge being necessary. Unfitness for service must be certified by the district school inspector, and approved by the Provincial States' Deputies.

In calculating pensions the only services which count are those rendered as principal or assistant instructor in a public primary school.

Those discharged without honorable certificates forfeit all claim to pensions.

XXVII. Pensions are calculated at one sixtieth of the salary received during the last twelve months, for each year's service. An honourable certificate of discharge is required, and the candidate must have paid the appointed contributions prescribed by Article XXVIII. But in no case can such pension exceed two-thirds of the last year's salary.

XXVIII. Contributions for pensions are reckoned, for principal and assistant instructors, from the date of this law's taking effect and consist in 2 per cent. on the salary. These contributions are credited to the State, collected by the communes, and by them paid into the Royal Treasury.

XXIX. The communes, by whom, in virtue of this law, pensions are awarded, are chargeable by the State with one-third of their amount.

XXX. The regulations contained in Articles XXII, XXIII, XXIV, XXVI, XXVII, XXVIII, XXIX, XXX, XXXI, XXXII, XXXVII, XL, and XLI of the law of May 9th 1846, as well as those in the law of May 3rd, 1851, are applicable to the pensions of principal and assistant instructors.

Part 3.—*Cost of Instruction.*

XXXI. Each commune contributes to the cost of its primary instruction, whatever is not paid by others, nor provided for in any other way.

XXXII. These costs are:

a. Instructors' salaries.

b. Pupil teachers' allowances.

c. Building and maintenance, or rent, of schools.

d. Purchase and maintenance of school furniture, books, &c.

e. Lights and fires in schools.

f. Building and maintenance, or hire, of instructors' residences.

g. Compensation to principal instructors on account of house rent.

h. Communal contributions to instructors' pensions.

i. Local school commission costs.

XXXIII. To meet these costs, a contribution may be levied on each school-going child.

Paupers, and those who, though not paupers, are unable to pay school money, are not liable to this contribution.

The communal administration will promote, as much as possible, the attendance of pauper children at school.

XXXIV. The impost, revision, and abolition of school moneys, occurs in accordance with Articles CCXXXII—CCXXXVI of the law of June 29th, 1851.

The imposition is fixed by local regulations pursuant to Articles CCLVIII—CCLXII of that law.

XXXV. For children of the same class in one school, school-money is identical.

For two or more children of one family attending school at the same time, a lower scale of contribution is accepted.

XXXVI. If we, on investigation by the Provincial States' Deputies and the Provincial States, judge that a commune is too heavily burdened by the charges required for the proper carrying out of its primary instruction, the amount of the communal contributions shall be settled by us, and the rest provided for by the provinces and the kingdom, each paying half.

CHAPTER III.—*Private Instruction.*

XXXVII. To give private school instruction and home instruction it is necessary to possess—

a. A certificate of qualification.

b. A similar document to that mentioned in Article XX, *b*.

c. A proof that both the above certificates have been seen and approved by the burgomaster and assessors of the commune where instruction is to be imparted.

XXXVIII. In giving the paper mentioned in Article XXXVII *c*, the burgomaster and assessors must not delay more than four weeks, counting from the day on which the application is made.

From this decision, or if such decision be not notified to the applicant within four weeks, appeal may be made to the Provincial States' Deputies.

If, after application to the Provincial States' Deputies, the decision is not communicated to the applicant within six weeks, appeal may be made to us.

XXXIX. Instructors who, in giving private or home instruction, inculcate doctrines at variance with morality, or encouraging disobedience to the law of the land, can be reported by the burgomaster and assessors, by the local school commission, or the district inspector, to

the Provincial States', Deputies, as having lost this qualification to give instruction.

This regulation also applies to instructors who are guilty of an improper mode of life.

CHAPTER IV.—*Certificates of Qualification for giving Instruction.*

XL. Certificates of qualification for giving school and home instruction are obtained by passing examinations.

XLI. Twice a year in each province opportunity is afforded for examination by a commission composed of one inspector and four sub-inspectors.

The commission holds its sittings in the capital of the province. It is ordered to employ experts.

The notification to the inspectors and the time of meeting are settled by the Minister of the Interior.

The examinations are public, except those for instructresses.

XLII. The date at which the examination will be held shall be made generally known.

Whoever wishes to undergo examination must report himself in good time to the inspector of the district in which he resides, or, if he comes from abroad, to the inspector of the place where he intends to undergo examination.

At the same time certificates of good behaviour and birth must be handed in.

The day and place of the examination are notified to candidates by the inspector.

XLIII. To be admitted to examination the necessary age must be attained.

This is fixed for house instructors, house instructresses, assistant instructors and instructresses, at eighteen years; for principal instructors and instructresses, at twenty-three years.

XLIV. In the examination for assistant instructors or instructresses the following acquirements are necessary to obtain certificates:—

Good reading and writing;

Complete knowledge of syntax, the rules of spelling, and of Dutch composition;

Facility of expression in writing and speaking, both of which must be grammatical and correct;

The rudiments of grammar;

Arithmetic with vulgar and decimal fractions as applied to coins, weights, and measures;

Assistant instructors must also pass in mathematics;

Geography and history;

Elementary natural history;

Singing;

The principles of education.

XLV. To obtain a certificate of qualification as principal instructress the same amount of knowledge is required as for an assistant instructor, only more grounded, as applicable to her destination as principal instructress.

XLVI. To obtain a certificate as principal instructor the same knowledge is required as for an assistant instructor, but more grounded, more thorough, and more developed.

XLVII. Applicants for certificates under the last mentioned three classes can be additionally examined in one or more branches, mentioned from *k* to *p* in Article I.

XLVIII. Examination for obtaining a certificate as house instructor or instructress comprises one or more of the branches mentioned in Article I.

A similar knowledge is demanded in such cases as for an assistant instructor.

XLIX. When examination has been passed to the satisfaction of the commission, this latter hands the certificates of qualification to the successful candidates.

Certificates of qualification to impart school instruction must bear witness to the branches of more extended primary instruction in which the bearers have passed favourably.

In the same way, certificates of qualification to impart home instruction must specify the branches of primary instruction in which examination has been satisfactorily undergone.

L. Certificates of qualification are delivered on payment of—

10 florins for principal instructors and instructresses.
5 „ for assistant „ „
5 „ for house „ „ in more than one branch.
2 „ for house instructors and instructresses in one branch.

For the first signature on certificates for school instruction, 3 florins are payable, and for house instruction in one branch, 2 florins. The first signature on certificates for house instruction in more than one branch, and all further signatures are gratis.

These moneys go towards defraying the expenses of the examination commission. Any surplus is paid into the Treasury.

LI. Certificates of qualification are valid throughout the kingdom; those for school instruction are valid for home instruction, and those are valid for home instruction which certify qualification in one of the branches mentioned under letters *b*, *c*, and *i*—*p*, of Article I.

Certificates of qualification as principal instructor and instructress entitle the recipient to be assistant instructor or instructress.

In the cases provided for in Article 20, certificates of qualification as assistant instructor, qualify the recipient to be placed at the head of a public school.

Chapter V.—*School Inspection.*

LII. Subject to the Minister of the Interior, the following are charged with school inspection:—

a. Local school commissions;
b. District school inspectors;
c. Provincial inspectors.

LIII. Each commune has a local school commission.

The communes which, according to paragraph 3 of Article 16, have united in the establishment and maintenance of a common school, there shall be one common school commission.

LIV. In communes of less than 3,000 souls, the school commission is entrusted to the burgomasters and assessors.

In other communes the commission is named by the communal council.

Membership of this commission is compatible with membership of the council.

LV. Every province is divided by two into school districts.

Each district shall have a school inspector.

In case of death, sickness, or absence of the school inspector, our Minister of the Home Department shall provide a substitute.

LVI. School or sub-inspectors are appointed for six years.

They are eligible for re-appointment.

They can at any time be dismissed by us.

LVII. School or sub-inspectors receive from the Treasury allowances for travelling and maintenance.

LVIII. Each province has its inspector.

Provincial inspectors are appointed by us, and may at any time be dismissed by us.

They receive from the Treasury a salary, and travelling and maintenance allowances.

LIX. Provincial inspectors are called together once a year by the Minister of the Interior to discuss and promote the interests of primary instruction.

LX. Inspectors shall fill no office, or employ without our permission.

LXI. The members of the local school commissions, the school sub-inspectors and inspectors, shall, on appointment, swear to be true and faithful to their office.

In communes of 3,000 souls and over, this oath is administered to members of the local school commission by the burgomaster. In other communes, by the magistrates of the canton. School sub-inspectors are sworn by the commissary of the province. Inspectors are sworn by the Minister of the Home Department.

LXII. The members of the local school commissions, school sub-inspectors, and provincial inspectors, are empowered to sue and to be sued in carrying out this law.

LXIII. All schools where primary instruction is given, both public and private, shall at all times be open to members of the local school commissions of the communes, to the school inspector of the district, and to the inspector of the province.

Instructors are required to give all explanations concerning the school, and the nature of the instruction given.

Refusal will be punished with fine of 25 florins, or imprisonment for three days; and on repetition, by both penalties together.

Article 463 of the Penal Code, and Article 20 of the law of June 29th, 1854, are applicable to the above.

LXIV. Local school commissions shall minutely examine all schools in the commune where primary instruction is given; shall visit them at least twice a year, either in a body, or by commisson appointed among themselves; they shall see that the regulations for primary instruction are accurately carried out, as regards the instructors, the number of scholars, and the conditions of instruction. They shall send in, by the 1st March, to the communal council, a detailed report thereupon, and shall furnish a copy of this document to the district school inspector. They shall moreover impart to this functionary all changes that the schools have undergone, shall give him and the provisional inspector every information they may require, and shall finally accord to the instructors all co-operation, assistance, and support in their power, and seek to promote the prosperity of the schools.

LXV. School inspectors shall keep themselves continually informed of the condition of instruction in their districts; shall visit, twice a year at least, all schools within it where primary instruction is given, minutely inquiring into everything. They shall see that the regulations for primary instruction are accurately carried out; they shall act in concert with the local school commissions and communal authorities, and shall impart to them, as well as to the provincial inspectors, their observations on the requirements and condition of education. They

shall, moreover, acquaint the inspector with all that happened during their visitations, and impart to him all details he may demand. On the 1st of May of every year they shall address to the inspector a full report on the condition of instruction in their districts, sending a copy of this document to the Provincial States Deputies. They shall, so far as possible, supply the want of instructors, and promote their harmony.

LXVI. School, or sub-inspectors, have access to meetings of all local school commissions in their districts, and have a voice in all their deliberations.

LXVII. Provincial inspectors are bound by personal visit, by word of mouth, and in writing, in concert with the district school inspectors, local school commissions, and communal authorities, to do their utmost for the improvement and promotion of instruction. They shall impart to our Minister of the Interior full information on all subjects. They shall draw up, from the annual reports of the school inspectors, and from their own observations, an annual paper on the condition of instruction in their province, sending the same to our Minister, above-named, by the 1st of each July.

Chapter VI.—*Transitional Regulations.*

LXVIII. Instructors and instructresses, public and private, and house instructors and instructresses, in discharge of their duties at the date of this law being carried into effect, require no recognition to enable them to continue their duties.

After such date, certificates of admission to teach of the first and second grade, shall be regarded as equivalent to certificates of qualification as principal instructor; those of the third grade shall rank with certificates of qualification as assistant instructor; and those of schoolmistress shall rank with certificates of qualification as principal instructress, but only within the provinces or communes in which they were given.

House instructors and instructresses who, after that date, desire to establish themselves in another commune, are compelled to submit to the examination mentioned in Article XLVIII.

Principal instructors, who at the time of this law's taking effect, teach in private schools of the second class, and possess at least the second rank, may, provided the schools be accepted as public primary schools by the communal authorities and the district school inspector, receive appointments as principal instructors.

The regulations of Article XXII, concerning competitive examinations, do not apply to the above.

LXIX. Salaries, existing at the time of the taking effect of this law for principal instructors and instructresses, shall in no case be reduced so long as the above continue in employ, and shall be calculated at an average on the last five years. For those who have filled their positions for a shorter period of time than five years, the last year's salary will be taken as a standard.

LXX. In carrying out the provisions concerning the regulation of the number of scholars as proportioned to the population, and the requirements and extension of instruction; the aid to be afforded to the principal instructor; the salaries and other advantages of the principal and assistant-instructors, and the additions on account of pupil teachers.

The cost of instruction (Articles XXXI–XXXV) shall be granted for a period of three years at most, counting from the date of this law taking effect.

During this period the salaries of the public instructors and instructresses, the communal and provincial contributions, and those of the kingdom, shall continue to be paid in accordance with the practice at the time of this law taking effect.

LXXI. Private schools, which at the time of this law taking effect are in receipt of subsidies from communes or provinces, and do not come under the provisions of paragraph 4 of Article III, cannot receive such subsidy for more than one year after the above date.

LXXII. Pending legislation on secondary education, the provisions of this law apply to everything concerning more extended instruction in modern languages, science, and natural history.

To be admitted to examination for a certificate of qualification for one or more branches of such instruction, an age of at least 18 years must have been attained. For this certificate the charge is five florins.

LXXIII. This law takes effect on the 1st of January, 1858.

Save in the cases mentioned in Article LXX, the existing general, provincial, and local regulations for primary instruction shall then be abolished; the provincial and local school commissions and commissioners of local school inspection shall be dissolved; the district school inspectors discharged, and replaced by the school inspection provided by this law.

We therefore decree, &c., &c.

(Signed) WILLIAM.

The results of this law may be stated generally to have been:—the provision of primary instruction in 1865 for 432,383 children, or a fraction under one-eighth of the entire population of this kingdom, at a total cost of 374,127*l.* annually, or about 17*s.* 3½*d.* a head. Of these children, 225,544 received instruction gratuitously, and for the remaining 206,839 school money was collected to the amount of 62,139*l.*, or rather more than six shillings a head.

The class of instruction diffused at this price may be gathered from the following extract from the report of the Government School Commission:—

"In many schools too little attention was paid to reading, but general satisfaction was expressed with the writing taught. Arithmetic was stated to be on a less favourable footing. Complaint was made of too much 'summing,' and too little classical arithmetic and grounding in the rules. Spelling is now generally taught according to the excellent systems of De Vries and De Winckel. Geography is too much studied from a theoretical point of view, and too little from a practical regard to the produce of various climes and their local industries. Too much preference is accorded to the study of ancient history and the middle ages. A marked advance is reported in gymnastic exercises. Foreign languages are only satisfactory where taught by foreign masters and mistresses, and leave generally much to be desired; but this branch of knowledge, and mathematics, the commissioners consider unadvisable in schools for primary instruction."

It is generally conceded by its friends and enemies alike, that the law of 1857 works better in the country than in towns. This is owing to the competition offered in the latter by the sectarian schools established by ultra-Protestants and Roman Catholics, which afford excellent education, and spare no cost and pains in order to induce children to attend.

Since the law of 1857 was passed, the party in its favour cannot be

said to have decreased; they are even said to count 15 additional votes in the Second Chamber, as compared with the lists of 1857. It is therefore unlikely that more will take place this year in the Chamber on this subject, than a renewal of the usual desultory discussions.

Table I. shows the numbers and classes of public and private schools open in 1865, as compared with 1864.

TABLE I.

Class of School.	1865	1864
Public Primary Schools..	2180	2177
Public Primary School extended	385	381
Subsidized Private Primary Schools	85	87
Subsidized Private Primary Schools extended ..	117	114
Non-subsidized Private Primary Schools	300	289
Non-subsidized Private Primary Schools extended ..	606	616
	3623	3614

The numbers, sexes, and classes of teachers employed in giving instruction in the above schools during 1865 and 1864 is shown in Table II.

TABLE II.

Class and Sex of Teachers.	1865	1864
In Public Schools.		
Principal Instructors..	2482	2491
Assistant Instructors..	1889	1791
Pupil Teachers (male)..	2049	2256
Principal Instructresses	34	33
Assistant Instructresses	139	147
Pupil Teachers (female)	85	116
In Subsidised Private Schools.		
Principal Instructors..	102	100
Assistant Instructors..	82	75
Pupil Teachers (male)	25	32
Principal Instructresses	40	42
Assistant Instructresses	51	60
Pupil Teachers (female)	10	12
In Non-subsidized Private Schools.		
Principal Instructors..	567	562
Assistant Instructors..	792	783
Pupil Teachers (male)..	686	678
Principal Instructresses	344	344
Assistant Instructresses	681	691
Pupil Teachers (female)	172	169
In all Primary Schools taken together.		
Principal Instructors	3151	3153
Assistant Instructors	2763	2652
Pupil Teachers (male)	2760	2966
Principal Instructresses	418	419
Assistant Instructresses	871	878
Pupil Teachers (female)	267	297

Table III. gives the numbers and sexes of the children who attended the various primary schools on January 15th, 1865, as compared with similar returns for 1864.

TABLE III.

Class of School.	1865.		1864.	
	Boys.	Girls.	Boys.	Girls.
Public Schools	193,865	149,140	188,213	145,694
Subsidized Private Schools	3,252	2,714	3,298	2,779
Non-Subsidized Schools ..	37,111	46,301	37,251	44,958
Total ..	234,228	198,155	228,762	193,431

Showing an increase during the year of 10,190 children attending school.

The School Commissioners observe that, notwithstanding this increase in the total school attendance, the regularity of attendance still leaves much to be desired. This is, above all, the case with children of nine years of age who absent themselves at certain periods of the year, especially in summer, to labour in various ways.

This absence during 1865 has not been less than it was in 1864, being 24 per cent. of the boys and 29 per cent. of the girls, of six, seven, and eight years old; and 18 per cent. of boys and 26 per cent. of girls, of nine, ten, and eleven years old.

Absence from school bears the smallest proportion to the school-going population in the provinces of Groningen and Dreuthe, being 19½ per cent. In Overypel it is 20 per cent., in Friesland 21¾, in Guelderland and South Holland 22¼, in Utrecht 22¾, in North Brabant and Limburg 26, and in North Holland and Zeeland 30.

This calculation, as compared with the labour market, proves that school attendance is in some degree subordinate to the value of the services of the children in the fields, and that the non-attendance rate is highest in the best cultivated districts. It is, however, satisfactory to note that evening schools, which may be supposed to meet the wants of this section of the growing population, were attended on January 15, 1865, by 58,222 boys and 24,246 girls, showing a total increase on the returns for 1864 of 3,869 children.

The table that now follows shows the statistics of positively gratuitous primary instruction on January 15, 1865 compared with 1864.

TABLE IV.

Class of School.	1865.		1864.	
	Boys.	Girls.	Boys.	Girls.
Public Schools	107,722	86,817	103,256	83,564
Subsidized Private Schools	407	531	467	489
Non-Subsidized Schools ..	12,568	17,499	12,127	16,812
Total ..	120,697	104,847	115,850	100,865

This shows an increase on the corresponding returns for the previous year, especially in the public schools.

The total expenditure of the State on primary instruction during 1865 is given in Table V. Tables VI and VII show the gross cost of primary instruction throughout the kingdom, and the income and expenditure of the communes on the same account.

TABLE V.

State Expenditure on Primary Instruction.

	Florins.	*c.*
Contributions to Communes in virtue of Art. 36 of the law	109,244	80[5]
„ „ „ in place of former Government Aid	73,050	00
Government Primary School at Maestricht	8,381	05
Instruction in Poor-houses and Reformatories	6,663	68
Instructors' Salaries	401	70
„ Pensions	64,000	64
Teachers' Schools	155,887	86[5]
„ Clubs and Societies	5,100	00
Inspectors' Salaries	25,200	00
„ Travelling and other Expenses	5,178	25
Sub-Inspectors	43,803	70[5]
Examination charges	1,057	34[5]
Total ..	497,969	92
In 1864 ..	472,828	43
Increase ..	25,141	49

To be Deducted from Expenses of 1865.

	Florins.	*c.*
Surplus of Examination moneys in Guelderland, Utrecht, Groningen, and Dreuthe	204	03[5]
Instructors' Contributions to Pensions Fund	73,938	32[5]
Receipts of Government Primary Schools	8,876	19
	53,018	55
Gross Expenditure, 1865	497,969	92
Deductions	53,018	55
Net Expenditure, 1865	444,951	37
Ditto 1864	421,814	81[5]
Increase	23,136	55[5]

TABLE VI.

Total Cost of Primary Instruction, 1865.

	Florins.	*c.*
Instructors' Salaries	2,435,490	70
School Rents	179,276	18[5]
New Schools	815,879	66
School Repairs	235,240	02
School Furniture and Necessaries	409,793	68
Instructors' Pensions	106,557	36
Subsidies to Private Schools	41,223	40[5]
Teachers' Schools	170,180	86[5]
Do. Clubs and Societies	5,100	00
School Inspection	90,337	09[5]
Intercommunal Charges	23,514	60
Other Communal Expenses	76,929	08[5]
Total	4,489,522	65[5]
In 1864	4,262,193	37
Increase	227,329	28[5]

The total expenditure of previous years since the passing of the new law has been as follows, showing a constant tendency to increase :—

	Florins.
1858	2,380,980
1859	2,687,720
1860	3,234,606
1861	4,142,404
1862	4,309,515
1863	4,235,960

TABLE VII.

Communal Expenditure.

	Florins.	c.
Instructors' Salaries	2,399,174	73
School Rents	79,276	18
New Schools	815,879	66⅝
Repairs	235,312	95
Furniture and Necessaries	303.618	59
Lights and Fires	103,590	35
School Commission	16,155	14
Pensions	41,799	46
Subsidies to Private Schools	41,223	40⅝
Teachers' Schools	13,393	00
Intercommunal Charges	23,514	60
Miscellaneous	76,929	08⅝
Total	4,149,867	15⅝
In 1864	3,926,649	98
Increase	223,217	17⅝

Communal Income.

	Florins.	c.
School Moneys	745,668	37⅝
Government Contributions	73,050	00
Communal do.	23,514	60
Subsidies according to Art. 36	218,489	61
Provincial Subsidies	1,000	00
Private Funds	68,710	59⅝
Total	1,130,433	18
In 1864	1,070,812	49⅝
Increase	59,620	68⅝
Net Expenditure, 1865 ..	3,019,433	97⅝
Ditto 1864 ..	2,855,837	48⅝
Increase	163,596	49

In Tables VIII, IX, and X the statistics of the working of the new law, during the first eight years it has been in force, are given :—

TABLE VIII.

PUBLIC SCHOOLS.

Year.	Scho	Scholars.	Instructors.
1858	2,516	291,602	4,891
1859	2,498	296,950	4,758
1860	2,490	294,503	5,165
1861	2,501	284,440	5,735
1862	2,535	323,408	6,182
1863	2,549	334,829	6,579
1864	2,558	333,907	6,837
1865	2,565	343,005	6,678

TABLE IX.

PRIVATE SCHOOLS.

Year.	Schools.	Scholars.	Instructors.
1858	1,034	79,050	3,120
1859	1,065	83,054	3,140
1860	1,049	82,778	3,231
1861	1,073	81,272	3,293
1862	1,072	86,951	3,461
1863	1,059	87,528	3,576
1864	1,056	88,286	3,528
1865	1,058	89,378	3,552

TABLE X.

ALL PRIMARY SCHOOLS TAKEN TOGETHER.

Year.	Schools.	Scholars.	Instructors.
1858	3,550	370,652	8,011
1859	3,563	380,004	7,898
1860	3,539	377,281	8,396
1861	3,574	365,712	9,028
1862	3,607	410,359	9,643
1863	3,608	422,357	10,155
1864	3,614	422,193	10,365
1865	3,623	432,383	10,230

In view of the facts tabled above, it is difficult to dispute the success of the law of 1857, so far as numbers are concerned. This is the more difficult, as there exist no reliable statistics of the working of the law of 1806, with which they can be compared. The changes introduced in 1857 were so radical, as to call into existence new combinations of figures. Schools became subject to a different classification. Many primary schools were promoted to the rank and dignity of secondary educational establishments, while "Bewaar," or infant schools, evening schools, and schools for adults, formerly included in the statistics for primary education, were deemed to form a separate category of their own. It may be added, that previous to the passing of a Bill in 1862, by Mr. Thorbecke, no proper regard was paid in this country to the compilation of accurate tabular returns; since that date, however, the change in this respect has been so constant and progressive, that if delay in publication in some instances be excepted, the statistics of the Netherlands now have little or nothing to be desired.

The two stumbling blocks in the primary instruction question in Holland at this moment may be termed the *religious* and the *gratuitous* questions. In both cases the ultra-Protestants are combatting the advanced section of the liberal party; and the ultra-Protestants comprise among their numbers, and are even led by, stanch Conservatives. The *religious* question has to do with the interdict imposed

in the law of 1857 on religious teaching at Government expense, and in school hours. The *gratuitous* question is slightly more complicated in its character, but may almost be termed a second issue on religion. The law of 1806 recognized the teaching of religion, and in a way provided for it. All went well until after union with Belgium in 1815, the Catholic interest was brought to bear successfully against the practical monopoly enjoyed by the reformed faith in the majority of Government primary schools. Meantime, Belgium was lost to Holland but the Romish influence, and this agitation ended in the law of 1857. Since that day the ultra-Protestant party has sought to recover its lost ground by the establishment of sectarian schools; but these are naturally exposed to severe competition by the gratuitous non-denominational instruction freely extended under the law of 1857.

Hence it comes to pass that the ultra-Protestants, under the guise of the moral effect produced upon the population by the payment of their mite towards the instruction of their children, combat the demands of Romans, Jews, and Radicals for extension of the gratuitous system.

The weak point of the present state of the law respecting gratuitous primary instruction, appears to be the proviso that no Government aid shall be accorded to any school not having a list of paying scholars. This works badly in the poorest districts, where such aid is most required; and subterfuges are not unfrequently resorted to in order to evade the written tenor of the law. One point on which all parties coincide is, the readiness of the wealthy in the land to contribute to national education. An instance of this is recently reported as having occurred at Rotterdam. A portion of the town had been in the habit of sending their children upwards of a mile through busy thoroughfares to the public school, where abundant educational resources awaited their use. The result, however, was thin attendance during bad weather, and frequent absences. The inspector of schools for the province of South Holland, Mr. Lindo, a man of considerable private and official influence, explained this need to the wealthy proprietors of the portion of the town in question, and a beautiful school for 500 children, built by private subscriptions, was the result. In fact, money is easily got in this country for educational requirements. Each commune raises, in its own way, what is necessary to make both ends meet, after the modest subsidies of the central Government, and the provincial contributions have been expended. The habit of self-government, characteristic of the Netherlands, is displayed to great advantage in such matters; money is wanted, and money is obtained by local boards for local objects with little or no difficulty; the only grumbling that reaches the public ear being on account of general imperial taxation.

In conclusion, it can but be interesting to all acquainted with this subject to know that the veteran champion of Christianity, M. Groen van Prinsterer, whom Mr. Matthew Arnold mentions in terms of due respect, as resigning his seat in the Second Chamber of the States-General on the passing of the law of 1857, has availed himself of the recent election in this country to announce his willingness to re-enter the lists, and again contribute the weight of his reputation to the maintenance of the Protestant cause, of which he has ever been the consistent advocate. Sincerely is it to be hoped that he may for many years remain to Holland and the world at large, as the example of a man who has the courage of his opinions, and does not shrink from their assertion.

The Hague, February 19, 1868.

T. J. H. THURLOW.

APPENDIX.

Inclosure in Lord Lyons' despatch (page 94).

Answers to Questions asked by the English Minister in Paris as to Industrial and Practical Education in France.

It appears to me to be difficult to answer the questions successively in the order in which they are put; to do this would involve repetition, and would render the exposition less clear. The questions have been put to me in accordance with a suite of ideas, and with a state of things different from those which exist in France. I think that it will be better first to give a general exposition of the state of professional* education, and then to come back to its three branches:—primary instruction, special secondary instruction, and technical instruction, referring for details to the printed papers, a list of which is appended.

General Exposition.

Organization of Professional Education in France.

The education given in France to the working classes and to young people, destined either for some handicraft, for some industrial pursuit, or for commerce, the education which may be called *professional*,* because it facilitates access to the trades and callings by which those who adopt them hope to insure a living, presents two very distinct characters, in consequence of which it may be theoretically and even practically divided into two branches: 1st, instruction which I shall term *general*, and 2nd, instruction properly called *technical*.†

The general instruction, which is meant to impart that preliminary knowledge which every individual ought to possess who wishes to apply himself to any craft or trade whatsoever, extends from the merest elementary notions up to the widest branches of knowledge, but its sole aim is to prepare the pupil for that more special and more practical instruction which forms the second part of the professional education, that is to say technical instruction properly so termed. The object of the latter is the methodical application (application raisonnée), but the practical, not the purely theoretical, application of scientific and artistic knowledge, and it is this application of the instruction either to industry, agriculture, or commerce, which determines its object.

General Education.

The general education is never given with a view to one trade or pursuit more than another; its general character always remains the

* The sense in which this term is used throughout this paper will be seen on the next page.

† I employ the term *professional* to indicate the education in general. The terms *special instruction* and *technical instruction* designate, as will be seen in the sequel, subdivisions of this professional education. In the law, as well as in the language of the administration, special meanings are attached to them.

same, but it may be more or less extensive, more or less profound, according as the pursuit for which the pupil is destined requires that his general notions and acquirements should be more or less extensive, or according to the degree to which he desires to carry his preparatory studies, or to develop his natural capacities. In accordance with the organization given by law to this branch of instruction in France, it embraces two degrees: primary instruction and secondary special instruction.

§ A. Primary instruction comprises necessarily moral and religious instruction, reading, writing, the elements of the French language, cipheriug, and the legal system of weights and measures, and (since the law of 11th March and 10th April, 1867) the elements of the history and geography of France.

It may also embrace, if desired, arithmetic applied to practical operations, the elements of general history and geography, some notion of the physical sciences, and of natural history applicable to the uses of life, elementary instruction in agriculture, industry and the laws of health, surveying, levelling, and linear drawing, singing, and gymnastics.*

Law of 15th March, 1850, Art. 23:

Ornamental drawing and drawing from models, modern languages, and the elements of geometry.

Law of 21st June, 1865, Art. 9:

The secondary special instruction comprises, like the primary education, subjects that are obligatory, and others that are left to the choice of the pupil.

It must necessarily comprise moral or religious instruction, the French language and literature, history and geography, applied mathematics, physics, mechanics, chemistry, and natural history, in their application to agriculture and industry, linear drawing, keeping of accounts (la comptabilité), and book-keeping.

It may, in addition, comprise one or several foreign languages, the ordinary notions of legislation, and of industrial and rural economy, and of hygienics, ornamental and imitative drawing, and vocal and instrumental music.

This system of education has been regulated under the name of secondary special instruction by the law of 21st June, 1865.†

Public education comprises, as is well known, three degrees: primary instruction, secondary instruction, and superior instruction.

Primary instruction is always the same, whether the pupil is to pass into the higher grade or not, the knowledge which is acquired in the primary schools is so indispensable and is so general in its character that it would have been useless to create a class of special instruction for those who are destined for some handicraft when they leave the primary school. It is to be considered as the minimum of knowledge that a man ought to possess.

Up to 1865 the law had organized only one single grade of secondary instruction, but in point of fact a special class of instruction had been formed in the lyceums and the colleges for such scholars as were destined for commerce, or for industrial or agricultural pursuits. The law of 21st June, 1865, has sanctioned this practice by dividing the secondary instruction into two branches, and by organizing a system of secondary special instruction.

Secondary instruction, properly so called, and such as it was, and still is, established in the lyceums or colleges, is adapted for youths

* See paper annexed.

† See the annexed papers.

destined for the learned and liberal professions, and who intend to complete their studies by entering into the higher schools. This course of instruction, literary and scientific in its character, opens up for the student the careers which require a knowledge of the ancient languages and literatures, and profound scientific acquirements.

The system of secondary special instruction, which has lately been organized, and which I have already defined, prepares the pupils for the various pursuits, as schools of industry, commerce, and agriculture.

Technical instruction seems thus to be the crowning of the edifice of secondary special instruction, as the higher course of instruction is that of the secondary literary and scientific instruction.

II. Technical instruction, far from being a mere repetition of that general education given in the primary and secondary special schools, on the contrary, supposes this to have been acquired in a measure proportionate to the ambition and to the necessities of the pupil. and it teaches them to apply, to practice, and to utilise, the scientific and artistic knowledge they have derived from other sources. A common stem ascending from the lowest grade to the highest summit of human knowledge, with lateral branches spreading out from this stem at different points, and confided to the care of practical instruction, represents pretty correctly what the two systems of instruction have in common, and wherein they differ:*

The system of the technical schools is, in reality, a system of apprenticeship, but connected with theory and method; it is meant to make up as far as possible for the deficiencies and even erroneous tendencies of apprenticeship in its ordinary form. The persons who avail themselves of these schools may therefore more properly be termed apprentices than pupils or students, in the ordinary acceptation of these words.

A project of law, at this moment before the Legislative Chambers, regulates the organization of the system of technical instruction. Art. I. of the proposed law defines it as follows: - The object of technical instruction is to teach the practice of the useful arts, and the application of scientific and artistic knowledge to the various branches of agriculture, industry and commerce.

Of these two systems of instruction, the first, comprising general education (primary and secondary special) is placed under the Minister of Public Instruction. The technical schools are placed under the Minister of Agriculture, Commerce, and Public Works.

For what concerns the sailor's profession, schools are provided in the name of the State, and under the superintendence of the Marine Minister.

It must be observed that the distinction made between the two

* Exposé des motifs du projet de la loi sur l'enseignement technique. P. 28. The following words, extracted from the report of Mr. Chauchard to the Corps Legislatif, on the presentation of the law of 21st June, 1865, on secondary special instruction, explain with great precision the functions and the character of the two systems of instruction:—

"On leaving these new schools (of secondary special instruction) the pupils will only have acquired general knowledge, and will neither have learned a handicraft or a trade. We do not introduce the workshop into the school, nor industry into the colleges. We desire that the youths should have the knowledge requisite to make them distinguished men, whatever trade they may select; we desire to furnish them with an instrument, a traveling pack, a viaticum. The instruction given is a means, not an end, in itself. It will, therefore, be proper to reserve the name of *professional* schools for the strictly special schools, such as the normal school, the schools of art and trades, the school of commerce, the school of fine arts, the schools of agriculture, the central school, &c., &c."

systems of instruction, the general and the technical, though perfectly correct in theory, ceases to be absolutely so in practice, that is to say, that although the general education alone is very often given in public and private, the same is not the case as regards technical instruction; most frequently the two systems are combined and taught simultaneously in those schools wherein technical instruction has been introduced. This fact is proved by an examination of various schools of technical instruction.

1st. *Primary Instruction.*

Primary instruction is free, that is to say, any person who can prove that he is in possession of certain capacities, and who remains within the limits of the programme of the subjects considered as constituting primary instruction (see Art. 23 of the law of 15th March, 1850, p. 3) is entitled to open a school of primary instruction.

On the other hand, the State secures to the citizens primary instruction, by maintaining at the public expense a number of schools.

There are in consequence two classes of primary schools.

1st. The schools founded and supported by the communes, the departments, or the State, and which are termed public schools.

2nd. Schools founded and supported by private individuals or associations, and which are termed free schools (écoles libres). (Law of 15th March, 1850).

§ I. Public schools.

Every commune is bound to supply one, or several primary schools. In some cases, when the communes are very small, one commune may join another, or several other neighbouring communes for the support of a communal school.

On the 1st of January, 1866, there were 36,692 communes, possessing one or more public schools each, and 694 which did not as yet possess any means of primary instruction.* Every year the number of the latter decreases.

The expenses of the schools are defrayed by the commune, and where insufficiency of means exist, they are supplemented by the funds of the department; finally the Minister of Public Instruction grants subsidies, which are annually included in the Budget of the State.

Every commune comprising more than 500 inhabitants must posses two distinct schools, one for boys, the other for girls.

The Department of Public Instruction cost in 1865, fifty-eight millions of francs, placed to the debit of the State. This amount will soon be considerably augmented. The State grants in addition important subsidies for the building of school-houses.

The school fees (rétribution scolaire) are generally very low, the ordinary amount is three francs a month.

Primary instruction is given gratuitously to all children whose families are not able to pay for them (law of 15th March, 1850, Art. 24). The mayor, assisted by the ministers of the different forms of worship, draws up every year a list of the children who are to be admitted gratuitously into the public schools. This list is submitted to the approval of the municipal council, and is definitely fixed by the

* See "Exposition de la situation de l'Empire, 1867," and also the statistical tables here appended.

prefect (law of 15th March, 1850, Art. 45). In the appended statistics will be found a table of the children admitted gratuitously into the public schools.

The number of children so admitted will in future be greatly increased, owing to the new administrative measures (decree of 28th March, 1866) taken to insure the full execution of Art. 24, already referred to, of the law of 15th March, 1850.

The teachers in the public schools are nominated by the prefect of the department.

The Municipal Council decides whether the school shall be confided to the care of a lay teacher, or to that of an ecclesiastic belonging to any of the religious denominations. The teachers in the public schools must fulfil the conditions hereafter to be named, and which are equally binding on the teachers in the free schools.

§ II. Free schools (écoles libres).

Every Frenchman who has attained the age of twenty-one may exercise throughout France, the profession of teacher in primary schools (public or free) if he be provided with a certificate of competency. For the certificate of competency may be substituted a certificate of three years' service in public or free schools authorized to take pupil teachers (*Stagiaires*), a diploma of Bachelor of Arts or Letters, a certificate showing that the holder has been admitted into one of the special schools of the State, or the title of minister of one of the forms of worship recognised by the State. (Law of 15th March, 1850, Art. 25).

The certificate of competency is given by a special jury after proper examination.

"Private societies, important religious associations, and private institutions participate in France with the State, under the ægis of liberty, in the great work of popular education. To enumerate them here would be impossible. Some examples will suffice to give an idea of their fruitful activity, which embraces the education of children and of adults, in technical education, and the dissemination of wholesome literature.

The Institute of the Brothers of the Christian Schools, and other congregations of men and women take, apart from the action of the State, an important share in the free school education; among lay societies, the Society for the Encouragement of Primary Instruction among the Protestants of France, the Society for Elementary Instruction, the Society for Primary Instruction in the Department of the Rhone, the Polytechnic Association, the Philotechnique Association, which occupies itself with the instruction of adults, and the undertakers of the Popular Lectures at Guebwilles, may be mentioned. On all sides societies arise spontaneously, the object of which is to aid the work of the Government by individual action. Such is the Society for the Encouragement of Popular Instruction in the department of the Haute Vienne, and divers similar associations founded for the same purpose in the departments of the Sarthe, of the Eure and Loire, of the Seine and Oise, of the Charente Inférieure, and of the Vosges.*

Numerous primary schools have been founded by intelligent masters in connection with the great manufactories, and in these schools the greater number of children receive instruction gratuitously.†

The work of children in factories has been regulated by the law of 22nd March, 1841, so as to insure religious, moral, and intellectual

* Extract from the Report on the tenth group in the Great Exhibition at Paris, 1867.

† See Report into tenth group.

education to those children whose parents are obliged to send them into the factories and workshops. Some modifications intended to insure the more complete execution of this law, and to give a greater development to its principles, are at this moment in contemplation.*

In France primary instruction is not only held out to children. During late years numerous educational courses for adults have been organized by the encouragement of Mr. Duray, Minister of Public Instruction.

In 1865-6 24,686 courses were opened in 22,947 communes, and were frequented by 552,939 men, and 42,567 women.

In 1866-7 the number of courses increased to more than 32,000.

It is not enough to teach people to read, you must disseminate good books among them. In the public schools school libraries have been formed. On the 1st of January 1866, 7,789 of these libraries contained 473,779 volumes.

In 1866 the Minister of Public Instruction distributed among the school libraries of 1,417 communes 77,870 volumes.

Many private associations follow the same course, for instance, in Paris the Franklin Society, the Society for the Improvement and Encouraging of Popular Publications, and the Society for the Dissemination of useful books.

Similar associations exist in several of the Departments under the patronage, and with the co-operation of the Council Général of each.

Agriculture and the Primary Schools.

In the rural districts the children who attend the primary schools are almost all destined for agriculture. Though not aiming at making the primary school a school of agriculture, the Minister of Public Instruction has nevertheless considered that it would be very much in the interest of these children if a special direction were given to their education, so as to prepare them for their future pursuit at the same time as they were instructed in the most elementary branches of the school, such as reading, writing, and ciphering.

A class of agriculture and horticulture has in consequence been organized in the normal schools destined to educate teachers for the primary schools. At the present time 44 out of the 78 establishments of this kind which exist in France, are furnished with the requirements for a course of theoretical and practical agriculture, and the land belonging to them amounts to a total of 88 hectares. The rest of the normal schools have as yet but a garden of limited extent, in which the pupils are taught merely the general principles of agriculture, and are given some notion of theoretical and practical horticulture.

Thanks to the agricultural instruction given to the masters, the pupils in 5,572 of the primary schools receive regular lessons in this art, and this practice may be greatly extended, as out of 41,494 public schools 26,220 have gardens. The question is at present under serious consideration.

The agricultural instruction given in the primary schools must not, however, be confounded with the technical instruction in agriculture

* According to the law of 22nd March, 1841, children cannot be admitted into factories or workshops except under certain conditions; never under eight years of age. No child below twelve years of age can be admitted unless it be proved by their parents or guardians that it is actually attending one of the public or private schools in the locality. Every child admitted into the factory or workshop must attend school up to the age of twelve years. Children above the age of twelve years may be exempt from attending school if they can prove, by a certificate from a resident schoolmaster, that they have received the primary elementary instruction.

which will be mentioned in the sequel. The object in the present instance is not to form scientific agriculturists, but to impart such general notions as may in future become practically useful.

II. *Secondary Special Instruction.*

Secondary special instruction is free like the primary instruction? It is, therefore, like the latter, given in public and in private institutions. (Law of 21st June 1865.)

1. *Public Institutions.*

The State is empowered to found lyceums for secondary special instruction, as it is empowered to found such establishments for secondary literary instruction. Since the passing of the law of organization, 21st June, 1865, a lyceum of this class has been founded at Mont de Marsan, and will serve as a model for institutions of the kind. On the 1st January, 1867, it numbered 237 pupils.

As regards communal colleges they may be founded, when required, by the the towns which are to support them, solely for the purpose of imparting the instruction in question. Several communal colleges have already been transformed into establishments for secondary special instruction exclusively. However this system of instruction may be, and very generally is, organized in all lyceums and colleges, by the side of the secondary literary instruction. This was the case even previous to 1865, for the object of the law of 21st June of that year was merely to define what constituted secondary special instruction, and to render the organization of it uniform (see Exposé de la Situation de l'Empire, 1867, p. 209 et passim). In 1866-7 out of the 67,705 pupils in the colleges and lyceums, 17,164 belonged to the classes for special instruction.

In connexion with every establishment in which secondary special instruction is given, and which depends upon the Minister of Public Instruction the law institutes a Council of Improvement (Conseil de Perfectionnement), the business of which it is to make known the requirements and the wishes of the population in regard to the school. The Government desires in this manner to call in the aid of the notabilities of commerce and industry to enlighten the administrative authority.

The full term of secondary special instruction is four years. Too heavy burdens must not, it was thought, be imposed upon families, and besides, in many trades it is necessary that apprenticeship should commence early. The studies conclude when the pupil is 15 or 16 years old.

For information respecting the method of instruction, see the volume which contains the decrees, ordinances and programmes in relation to secondary special instruction, p. 39 et passim.

A special course of studies (aggregation) has been instituted for those who wish to undertake the functions of a titular professor of secondary special instruction in the lyceums. A normal special school has been founded at Cluny in order to insure a supply of professors.

2. *Free Institutions.*

Any individual who can produce a diploma of bachelor of letters, or bachelor of arts, may open an institution for secondary special instruction. In default of such a diploma a certificate of competency given

after due examination in the subjects contained in a programme regulated by ministerial ordinances adopted after due deliberation in the Imperial Council of Public Instruction.

No one can be admitted to this examination under the age of 18. No other authorization is required; the term of service as pupil teachers (*le stage*), regulated with regard to secondary classical instruction, is no longer necessary.

The free (or private) institutions may receive from the commune, from the departments, or from the State, a school-house and a subsidy.

Every head of a school of secondary special instruction is bound to teach the subjects comprised in Art. I of the Law of 1865:—

"Secondary special instruction comprises:

"Moral and religious instruction;

"The French language and literature;

"History and geography;

"Applied mathematics, physics, mechanics, chemistry, natural history, and their application to agriculture and industry;

"Linear drawing, keeping of accounts, and book-keeping."

These subjects are all obligatory.

The course of instruction may comprise in addition:

One modern foreign language, or several, the ordinary notions of legislation, and of rural and industrial economy, and hygienics. Ornamental drawing, and imitative drawing, vocal music and gymnastics.

The pupils belonging either to the public or private schools, may, on leaving, present themselves before a jury nominated by the Minister of Public Instruction, to be examined, and to obtain a special diploma. This diploma confers no rights, and can in no case be demanded, it is merely intended to attest the nature and the extent of the acquirements attained, and to permit the young men to prove their capacities.

III. *Technical Instruction.*

The law which is to give a uniform organization to the schools belonging to this system, is at present under the consideration of the Legislative Chamber.

The statement of reasons (exposé des motifs) for this bill, and the bill, are among the documents appended.

In France the system of technical education constitutes in itself a centre of industrial development. In reality it dates only from the commencement of the present century. Up to that time apprenticeship was the only means of acquiring knowledge of a trade or other industrial pursuit. The insufficiency of that system has been recognised. The first attempts in technical education are due to the initiative of private persons.

At the present moment all educational establishments of the kind belong either to the State, or to private individuals.

"The establishments in which the State imparts technical instruction, may be divided into three categories. In one class primary instruction is given at the same time as technical instruction. Manual labour and school studies alternate through the day. In the second, the lessons are purely theoretical, but the purpose is to impart positive, scientific, and artistic knowledge, and the application of this to industrial undertakings. In the third class the object held in view is to form completely and directly, by the concurrence of the scientific school and the workshop, practical workmen in all branches of in-

dustry. These establishments have been founded at different periods, but they all date from the beginning of the century, and owe their principal increase to the present times. Though already numerous, they are far from sufficiently so for the necessities of industry such as it now exists in France.*

"The institutions founded by local administrations, or by private individuals are much more numerous and more varied in their character, and in order to appreciate them properly, two important distinctions must be held in view.

"Among these establishments the greater number owe their origin to religious and charitable motives: to preserve from evil, and to lead the young people of the working classes to a moral and religious life by means of practical training in some trade or calling, has been the object of the founders.

"The other institutions of the kind, which are not less useful, owe their origin to an enlightened appreciation of the requirements of industry and to the salutary influence which instruction and education exercise on work. The founders of these establishments have been zealous administrators or enlightened manufacturers."

In these institutions primary instruction is often given as well as technical instruction.

It is impossible to furnish exact and detailed accounts of these private establishments, which have nothing in common except the object which they hold in view, and which are all organized in a different manner, in accordance with the requirements of the trades with which they are connected, and the spirit in which they have been conceived by their founders.

In examining the public establishments we shall learn to know the most perfect type of the technical educational institutions.

State Establishments.

Technical instruction is given in establishments which sort under various Ministerial departments.

In the first rank must be placed those which are under the direction of the Minister of Agriculture, Commerce, and Public Works. In these are given agricultural and industrial instruction.

The action of the State in regard to them is two-fold. It acts directly by the institution of establishments which belong to it, which are organized by it, and which remain under its direction; and it acts indirectly by subsidizing establishments founded by private individuals.

Agricultural Instruction.

Instruction in agriculture as a trade only commenced in 1848. Up to that period the State limited itself to granting a few subsidies. The first was accorded in 1831 to Mathieu de Dombasle.

The highest class of agricultural instruction is at present given in the three imperial schools of agriculture at Grignon, at Grandjouan, and at La Saulsai, all of which were formerly private, but have now become State establishments.

Destined to educate professionally men who are to be at the head of great agricultural undertakings, either as proprietors or as farmers,

* Extract from the statement of reasons for the Bill on Secondary Special Instruction.

their principal object is to favour the improvement of husbandry, by *theoretical instruction* calculated to form enlightened agriculturers, by experience, *i.e.*, by experiments and essays in rural industry, and *by example*, *i.e.*, by offering opportunities for the observation of the highest and most advanced modes of culture.

The directors of a district school (école régional) is a simple steward (regisseur) charged with the cultivation and administration of the domain for the account of the State. At the side of the director, and under his authority, are placed the teachers. The instruction given is theoretical as well as practical. The pupils, who are all resident (internes), are admitted after competitive examination, (examen et concours). The course extends over three years, and on leaving, the pupil is examined, and receives a certificate of studies.

The State pays for eighteen scholars in each school.

In the second rank are the school farms, the object of which is to form practical agriculturists (des agents pour la culture); these schools have retained their character of private enterprises subsidized by the State, within certain limits, and under certain conditions. The business of the farm is carried on entirely at the risk of the proprietor or farmer of the domain, who is the director of the establishment. The State defrays the charge for boarding and lodging the apprentices, an amount which, together with their work, is given to the director to indemnify him for the expenses he incurs for the young men.

The expenses of instruction are borne by the State; they consist in the salaries of the director and of the teachers.

The number of school-farms is at present 48.

The instruction given in these establishments is principally practical; the object aimed at is the improvement and progressive development of the methods of cultivation in ordinary use in the localities in which the school-farms are situated, and the training of good practical cultivators in the branches of agriculture suited to the localities.

The term of apprenticeship is three years. On entering and on leaving the establishment the pupils are subjected to examinations. Premiums are granted to the ablest and most meritorious. There are at present about 1,300 apprentices distributed among the various school-farms.

The rural populations have become quite familiarized with these establishments, and fully appreciate the good results to which they lead. Apprentices on leaving the school very soon find situations.

In addition to the agricultural educational institutions which are regularly organized, the Government subsidizes several private establishments in which are received orphans, or children abandoned by their parents, or belonging to the hospitals or to very poor families, and also several reformatories founded by private persons belonging to the industrial classes, and destined to receive youths convicted of crime. The object of these establishments is to secure to agriculture the services of the children confided to them.

In order to complete this sketch of the means of agricultureal education provided by the Minister of Agriculture, mention must be made of the departmental professorships of agriculture (chairs départemental d'agriculture), which have been instituted in nine departments, and the missions confided by the administration to men specially qualified for the task, who travel about for the purpose of making agriculturists acquainted with new methods of culture, and with the great discoveries in agricultural science.

Industrial Instruction.

The same Ministry participates directly in industrial education by means of three different kinds of establishments which belong to it, viz.: The Imperial Conservatoire of Arts and Trades, the Imperial Central School of Arts and Manufactures, and the Schools of Arts and Trades.*

The instruction given in the Conservatoire by means of public gratuitous lectures, is limited exclusively to the sciences applied to industry. The fourteen courses of lectures which are embraced in this system of instruction are assiduously attended by youths, by foremen (contre-maitres) of industrial undertakings, and by workmen who have already received instruction.

The number of persons attending these courses is very large, and daily increases.

In connexion with the Conservatoire there is a school of elementary drawing.

The Imperial Central School of arts and manufactures, which was founded in 1829 by three savants, Messrs. Dumas, Péclet, and Ollivier, with whom was subsequently associated Mr. Lavallée, has, by the terms of the law of 19th June 1859, become a State institution. Its special object is still to train engineers for all branches of industry, and for those public departments the service of which is not reserved for the Government engineers. It is in this school that our great manufacturers and directors of industrial enterprise must seek instruction. The school can only receive day pupils, and the number of persons asking for admission is so great that more than the half must be refused. The term of the studies is three years. Diplomas of arts and manufactures, or certificates of competency, are given to pupils who have been subjected to certain examinations.

The central school is in truth an international institution, for it admits foreigners on the same footing as Frenchmen, and the number attending is considerable. The pupils of the central school occupy the highest situations in all branches of industry.

The three schools of arts and trades at Chalons, Aix, and Angers, which have been re-organised in conformity with a decree of 30th December, 1865, are destined to train able masters and workmen for all branches of industry in which wood and iron are employed.

These schools receive only resident pupils, and are recruited by competitive examinations (des concours).

The pupils, who enter at the age from 15 to 18, remain three years, consecrate five hours of every day to theoretic studies, and seven hours to the labours of the workshops, the forges, the foundries, the carpenter's and joiner's shop, &c.

If the pupils who leave these establishments may not all have acquired great dexterity of hand, and more especially the habit of great rapidity of practical execution, they are almost all excellent draughtsmen, possessing the fundamental knowledge of applied mechanics, and of the principles that serve as guides in the execution of various works, so that after some time spent in large workshops they soon secure to themselves advantageous positions there, and become excellent managers, foremen, and clerks of works.

From these schools issue on an average yearly 250 young men

* For details see "Note sur le service de l'enseignement professionel de l'Agriculture," of which the above passage is an analysis. Extract from the "Inquiry as to Group X in the Great Exhibition of 1867," p. 61.

capable of rendering themselves very useful, and who immediately find situations either as draughtsmen in great industrial undertakings, or as engineers on board steamers, or as ordinary workmen. In the latter case they generally rise rapidly to become foremen, if they do not succeed in setting up in business for their own account.*

The School of Mines at St. Etienne (Department of the Loire) and the School of the Master Miners of Alais (Department of the Gard) are under the direction of the chief engineers of mines, and also sort under the Ministry of Public Works.

A decree of 30th November, 1863, re-organized the school of horology at Chuses, in the department of Upper Savoy.

This establishment, which belongs to the State, is destined to train workmen who, in respect of the manufacture of all parts belonging to a watch, shall be able to compete advantageously with the workers of Switzerland.

The instruction given is gratuitous, and is both theoretical and practical. Those who seek admission must prove, by submitting to examination, that they are in possession of sufficient primary instruction.

Ministry of Marine.

The marine department provides for all persons wishing to become seamen the benefits of primary and professional instruction, either directly by means of its special schools, or indirectly by means of subsidies granted to similar free schools.

For details see report (enquête) on Group X of the Universal Exhibition. The documents which are there corrected are very exact.

Schools have been created in all the regiments of the army by the Minister of War, and also in the penitentiaries, which sort under the Ministry of the Interior.

See report on Group X, pp. 57 and 60.

A Bill on technical instruction is at this moment before the Legislative Chamber. A knowledge of the new measures which it proposes to introduce, and of the spirit in which it is conceived, may be obtained by a perusal of the statement of reasons (l'exposé des motifs) which precedes it. This statement is appended.

Inclosure in Mr. Doria's Report (page 44).

NORWAY.

Answers to Questions asked relative to Technical and Industrial Schools, in as far as regards the Technical School in Carljohansværn.

(Translation.)

1. In Carljohansværn there is a school connected with the naval workshops there, and destined especially for the education of mechanical engineers. The instruction given in the school is purely theoretical, but on leaving the pupils are admitted into the naval workshops in order that they may acquire practical knowledge.

* For details see "Inquiry respecting Technical Instruction," vol. ii, in report on Group X.

2. The school is mostly attended by youths who wish to become mechanicians, but admission is also granted to adults who are already practical workers.

4. The school is supported by the Government.

5. Hitherto the average number of pupils has been from twenty to twenty-five, but within the last two years applications for admission have been so numerous that an extension of the school is contemplated.

6. The pupils pay no school fees. The necessary expenditure for books, &c., for each pupil is calculated at from 10 to 15 specie dollars. The cost of lodging, &c., which is not provided by the school, is generally defrayed by the parents.

7. Admission to the school is only granted to persons having a previous knowledge of reading, writing, and elementary arithmetic; sometimes a knowledge of the rule of three is required. The period of attendance at the school is from one to two years. The practical instruction in the workshops lasts from four to five years.

8. The subjects of instruction in the school are: elementary mathematics, extended, in the case of specially gifted pupils, to the higher branches, theoretical mechanics, a certain amount of physics and inorganic chemistry, English, and drawing. The method of instruction is mostly that of making the pupils, under superintendence of the masters, go through all kinds of calculations and execute the easier forms of construction. Some few lectures also are delivered, admission to these is open to the workmen in the naval establishments who are not pupils of the school, but they do not often avail themselves of the privilege.

9. Attendance at the school during an entire course secures no other privilege than that of admission to the naval workshops for the acquirement of practical knowledge. Engineers in the service of the Royal Navy must attend the school before advancing into the higher grades.

10. The teachers are nominated by the Navy department. Hitherto those appointed have always been functionaries connected with the royal docks, whose qualifications have been proved there.

11. Men who have attended the school and the naval workshops are sought for in private industrial establishments as draughtsmen, engineers, superintendents of sawing works, &c., it being supposed that the training they have received qualifies them for such positions in preference to persons who have not the same amount of knowledge, but as the school has only been in existence during the last eleven years, no very strong and general opinions respecting it have as yet been established among the industrial population.

Carljohansværn, September, 1867.

Signed on behalf of the administrators of the school,

GEELMUYDEN.

SWEDEN.

Answers to Inquiries made by the Government of Great Britain relative to Technical or Industrial Education in Sweden.

(Translation.)

1. The technical or industrial instruction afforded in various schools and educational institutions in Sweden, aims in every case at imparting

either the theoretical or the practical elementary knowledge, or the scientific culture, required for the performance of the various trades.

There are schools for the promotion of technical knowledge in general, and other special schools of mines, ship-building, &c.

The former class comprises:

a. The technical Sunday schools and night schools established in Erskilstuna, Norrkoeping, Malmoe, Orebro, Borås, and other places.

b The technical elementary schools established in the above-named towns, as well as the Polytechnic School (Slögdskolan) in Stockholm, and the Polytechnic Unions School in Gothenburg.

c. The Technical Institution in Stockholm and Chalmers' Polytechnic School in Gothenburg.

The second class comprises:

a. The Elementary Mining School in Filipstad, and the School of Mines in Falun, which latter is hereafter to be united with the Technological Institution, and

b. The School of Naval Architecture in Carlscrona.

Each of the schools named is complete in itself, but some of them are at the same time meant to be preparatory institutions for such pupils as desire to enter some one of the higher educational establishments. Thus the Sunday schools and night schools constitute preparatory schools for the technical elementary schools, which in their turn prepare pupils fort he Technological Institution, or for the Chalmers' Polytechnic School, which holds about the same rank.

2. Although several of the schools named are more or less connected with special trades, inasmuch as persons who have already joined a trade are in preference accepted as pupils as well in the Sunday schools and night schools as in the Polytechnic School in Stockholm and the Polytechnic Unions School in Gothenburg; the schools of mines and the school of ship-building are nevertheless the only institutions which are directly connected with any special branch of industry. The pupils in these institutions are taught not only the theoretical but also the practical part of the business, those of the schools of mines by taking part in the various works carried on in the mines, smelting establishments, &c., and those in the school of naval architecture by working in the dockyards.

3. All classes of persons connected with industry, be they masters, journeymen, or mere labourers, are. as a general rule, admitted into the schools referred to, but the Sunday Schools and night schools are more especially suited for working mechanics, while the technical elementary schools are adapted for those who may desire to acquire greater insight into the various subjects connected with their trades, so that to their practical proficiency they may join such general knowledge as will enable them to fill the position of foremen, managers, &c. The Technological Institution and Chalmers' Polytechnic School are intended for persons desiring to obtain the scientific education required for technical pursuits. The schools of mines are intended to educate able mining engineers, and mining mechanics, as also managers of ironworks, while the principal object of the school of naval architecture is to provide good shipbuilders and competent workmasters for the dock yards.

The rest of the schools that have been referred to, viz., the Polytechnic School in Stockholm, and the Polytechnic Unions School in Gothenburg, combine the objects of Sunday schools and night schools, and technical elementary schools, and in consequence develop a double activity.

4. The Sunday schools and night schools are, as a general rule,

supported by the commune to which they belong, without any contribution from the funds of the State, but an exception is formed by the Sunday and evening school in Eskiltuna, which have been principally instituted with a view to encourage the iron and steel manufactures of the town, and which enjoy a Government subsidy of 5,000 rix dollars annually. The Polytechnic Unions School in Gothenburg is maintained by the commune, and by private contributions.

The technical elementary schools enjoy Government grants for the salaries of the teachers, the purchase of instruments, and other expenses connected with the instruction, but the commune must defray the cost of the building and of the internal arrangements of the school. The present amount of the Government grant is 12,000 rix dollars annually for each of these schools.

The Polytechnic School in Stockholm, the building for which was erected partly at the expense of the commune and partly at the public expense, has just obtained a Government grant of 79,000 rix-dollars, added to which the school enjoys contributions from the commune, and from the Swedish Industrial Union, and frequently has legacies left to it by private persons.

The Technological Institution is maintained entirely by the State, the amount expended on it being at present 55,500 rix dollars yearly.

Chalmers' Polytechnic School is founded and chiefly supported by means provided by a private individual, but enjoys also a Government grant amounting at present to 21,000 rix-dollars.

The School of Naval Architecture is supported by the State, the present annual grant being 7,000 rix dollars.

The School of Mines in Falun is supported partly by the State, partly by the Mining Association (*Bruks societeten*); the annual public grant is 9,700 rix dollars.

The Elementary Mining School in Filipstad, is entirely maintained by the Mining Association.

5. The number of pupils in the school term 1865–1866 was:

a. In the Sunday and night schools in Narrkoeping, Malmoe, Oerebro, Boras, and Eskiltuna (the only ones regarding which official reports are furnished), 633.

b. In the technical elementary schools 192.

c. In the Polytechnic School in Stockholm 1,346, of which 856 were male, and 490 female scholars.

d. In the Technological Institution 100.

e. In the Polytechnic Unions' School in Gothenburg 300.

f. In Chalmers' Polytechnic School 107.

g. In the School of Mines in Falun 20.

h. In the Elementary Mining School in Filipstad 20.

i. In the School of Naval Architecture 25.

6. The instruction given in the above-named schools (which are all externets or day-schools), is either entirely, or in a great measure, gratuitous.

In all the technical elementary schools the pupil pays a small entrance fee of 4 rix dollars, 50 oere, or at the highest 10 rix dollars, and, in two of these schools, as well as in the Polytechnic School in Stockholm, and the Elementary Mining School in Filipstad, a further contribution of 18 rix dollars 75 oere for one term, in the technical elementary schools, of 50 oere a month in the Polytechnic School, and of 50 rix dollars a-year in the Elementary Mining School.

Poor pupils are however exempt from these fees, if (as is not unfrequently the case) they be not defrayed by private manufacturers.

7. The age of admission into the various schools is as follows: in the Sunday and night schools, 12 years, in the Polytechnic School in Stockholm, 13 years, in the technical elementary schools, the ship-building school, and Chalmers' Polytechnic School, 14 years, in the Technological Institution, 16 years, and in the mining schools, 18 years.

The term of instruction in the Sunday and night schools, as well as in the Polytechnic School in Stockholm, and in the Polytechnic Unions School in Gothenburg varies according to circumstances, but no scholar can obtain a certificate who has attended the school less than one year. The course in the technical elementary schools embraces three years, in the mining schools two years, in the Technological Institutions, and Chalmers' Polytechnic School, three years, and in the ship-building school four years.

The pupils are all of the male sex, with the exception of the Polytechnic School in Stockholm, where females also are admitted, but have separate hours of instruction. The ages of the scholars, beyond the earliest named above, vary considerably.

8. The preliminary knowledge required for admission into the technical Sunday and night schools, the Polytechnic school in Stockholm, and the Polytechnic Unions' School in Gothenburg, is simply reading and writing, and, if the pupil belong to the Christian faith, a fair knowledge of his religion. For admission into the technical elementary schools, the pupils must further be acquainted with the elements of Swedish and German (or English) grammar, and have some knowledge of history and geography more particularly of their own country, be well versed in the four rules of arithmetic, as also in common and decimal fractions, and in the elementary rules of geometry. For admission into the School of Naval Architecture about the same amount of knowledge in most of these branches is required, the requirement in arithmetic being however extended to the simple and double rule of three; and a knowledge of English grammar is substituted for German. The requirements for admission into the Technological Institution and Chalmers' Polytechnic School are further, a knowledge of the first six books of Euclid, stereometry, the first and second of algebra, the elements of plain trignometry, the use of logarithms, physics, chemistry, and mechanics, in addition to which the candidate must be able to express himself distinctly and tolerably correctly in writing in the Swedish language, and to translate readily from easy German authors. Very nearly the same acquirements are demanded for admission into the school of mines, with this difference, that the candidate must have gone through a more extended course of chemistry, natural philosophy, and mechanics, or must have passed the examination in the science of mining, &c., at the university.

The subjects of instruction in the Sunday and night schools are principally arithmetic and geometry, linear and free drawing, mechanics, natural philosophy, and chemistry (with special reference to the particular branches of industry carried on in the locality in which the schools, are situated), modelling, book-keeping, and orthography.

The mode of instruction is partly by lectures illustrated when necessary by experiments, drawings, and models, or by the exhibition of manufactured articles, raw materials, &c., partly by questions relating to the various subjects taught, and partly by drawings and other works executed under the guidance of the teachers.

The subjects of instruction in the technical elementary schools are:

1. Mathematics, comprising arithmetic, elementary geometry, two

degrees in algebra, the use of logarithms and series, and trigonometry.

2. Linear drawing, comprising plain drawing, elevations, and perspectives of tools, machines, buildings, &c., &c., principally from models.

3. Free drawing, principally of ornaments, household furniture, and other objects applicable in architecture, crafts, and trades; also modelling in clay and wax, with a view to the development of taste and skill in certain branches of industry.

4. Mechanics, theoretical as well as applied to machines, or connected with manufactures, agriculture, or including the elements of architecture and mechanical technology, comprising a knowledge of the most important raw materials used in those various branches of industry, and of the manufactured produce.

5. Practical work in the workshops of the school.

6. Natural philosophy in general, and with special reference to the various trades, and illustrated by experiments.

7. Chemistry partly general, partly applied to trades, and elucidated by experiments, and the exhibition of materials, and practised in the laboratory of the school.

8. Botany and zoology, principally with reference to plants and animals, technically useful, and such parts of these as enter into trade and industry.

9. Exercises in languages, and finally,

10. Bookkeeping and the science of commerce.

The extent to which the different subjects are taught varies according to the requirments of the industrial enterprise of the localities in which the schools are situated.

The method of teaching is very nearly the same as that employed in the technical Sunday and night schools.

In the Polytechnic School in Stockholm instruction is given in:—

1. Mathematics, to the same extent as in the technical elementary schools.

2. Linear drawing, with the rules of perspective, projection, and shading.

3. General drawing, embracing linear, block, ornamental, figure, and pattern drawing.

4. The theory and designing of machinery.

5. General architecture, including naval architecture and designing.

6. Engraving on stone, copper, and wood.

7. Modelling in clay and wax.

8. Painting in water colours, lime colours (Lumfary), oil, &c., and on porcelain.

9. Making flowers.

10. Modern languages.

11. Bookkeeping, &c.

In general the school endeavours in each of the technical classes to adapt the instruction to all important branches of industry which exist in the country, or which it is sought to introduce.

The Polytechnic Unions School in Gothenburg aims at the same objects as the Stockholm School, but, owing to its inferior resources, the instruction does not as yet embrace the same number of subjects.

The method of instruction in both schools consists partly in lectures, partly in lessons, but principally in practical exercises.

The subjects taught in the Technological Institution, and in Chalmers' School are —

1. Pure mathematics, comprising principally analytical geometry, and the elements of the theory of equations, as also of the differential and integral calculus.

2. Practical geometry, comprising land surveying and levelling with regard to the construction of roads and waterworks, and other technical matters.

3. Descriptive geometry in general, as also with special application to constructions of stone and wood, and to perspective and the delineation of shadows.

4. Theoretical mechanics, or the theory of the balance and motion of bodies, comprised in which are the theories of the arch, of the pressure of loose masses of earth, and of such constructions in wood and iron as occur in building works.

5. Applied mechanics, referring to machines, engines, and instruments which either are destined to put into action or to communicate the powers of nature, or such as have a more general application.

6. Mechanical technology, comprising the knowledge of how to produce such manufactures as require exclusively, or at least in a great measure, mechanical means for their production, as also of the raw materials required for these and of the properties of the manufactured produce.

7. General physics.

8. Applied physics, with special reference to the technical application of heat, light, electricity, and magnetism.

9. General chemistry.

10. Chemical technology, comprising a knowledge of how to produce such manufactures as principally depend upon chemical operations, as also of the raw materials used in these operations, and of the properties of the manufactured products.

11. Mineralogy and geology, in as far as these sciences are of any practical use.

12. Architecture in its general principles, and more particularly domestic architecture.

13. The construction of roads and waterworks.

14. Drawing, linear and free, and the washing-in of colours (lavering).

And, in Chalmers' Polytechnic School—

15. Modelling, free standing figures, bas-reliefs, and ornaments in clay, wax, and plaster of Paris.

In addition to the above the pupils are taught in the workshops of the schools to handle the tools, and the simple kinds of machines used for working in metals and in wood.

The method of instruction consists :—

a. Lectures delivered by the teachers, illustrated in such cases as require it by models, drawings, tests, and experiments.

b. Examination of the pupils in the subjects taught, and in the solution of the problems given.

c. Description and drawing of machines, apparatus, buildings, and other subjects of instruction, and the execution of plans of industrial enterprises, in each case under the guidance and superintendence of the respective masters.

Finally—

d. Practical exercises, under superintendence of masters, in surveying and levelling, applied mechanics, general chemistry, chemical technology, drawing, and working in metals and wood.

The subjects taught in the School of Mines at Falun are principally analytical chemistry, mineralogy, metallurgy, the surveying of mines,

and practical geometry, mechanics, more especially applied to constructions used in mining enterprise, geology, the science of mining, including the theory as to the locality in which the useful metals are generally found, and the means of finding them, the blasting and the measurement of mines. In addition to the above the pupils acquire practical knowledge by visiting, with their teachers, the various mines and furnaces on the spot, as well as in different other localities, and by drawing plans on the basis of the measurements made on these occasions.

As the School of Mines will in future, as has already been mentioned, be united with the Technological Institution, it will be necessary to add to the three divisions of instruction already existing in the latter, viz., the construction of machinery and mechanical technology, the construction of roads, and hydraulics and chemical technology, a fourth for the science of mining in its three branches, mining mechanics, the construction of furnaces and other smelting works, and mining engineering.

The subjects taught in the Elementary Mining School in Filipstad are theoretical and practical geometry, plane trigonometry, physics, mechanics, linear drawing, levelling, chemistry, geology, mineralogy, and metallurgy. As regards iron, the scholars acquire, in addition, by visiting mines, furnaces, or other works, practical knowledge in all matters concerning the treatment of iron.

In the School of Naval Architecture the subjects taught are—

(*a.*) Mathematics, comprising planometry, stereometry, algebra, plane trigonometry, conic sections, mechanics, hydraulics, descriptive geometry, differential and integral calculus.

(*b.*) Designing (skeppritning) and working drawings of merchant vessels.

(*c.*) Theoretical and practical ship-building, mast-making, and a knowledge of the materials used in ship-building.

(*d.*) The measurement of ships.

(*e.*) The science of steam-engines.

(*f.*) Linear drawing.

(*g.*) Free drawing.

(*h.*) The English language.

(*i.*) Practical participation in ship-building, each pupil being bound to be employed at least 100 days in the year at work in the docks, for which he receives daily pay.

9. None of the educational institutions mentioned enjoy any special privileges, unless it be considered such that the pupils of the Mining School have a negative right to appointments in the office of the Mining Department. For the exercise of any branch of technical industry nothing more is required, in general, according to the statutes of the Corporations, than a testimonial of good conduct, and that the person shall possess full right over himself and his property. If there be a question of the establishment of a manufacture, the operations of which involve danger to life and property if not carefully managed, then, indeed, the law demands that he who undertakes it must either himself give proof of understanding the matter, or of having selected a competent person to superintend the works; but there is no rule that such persons should be sought among the pupils of the various technical schools.

10. With exception of the cases named below, the teachers in the schools referred to are appointed by the directors of the schools.

The superintendent (who is at the same time head-master) of the Technical Sunday and Evening School in Erskilstuna is appointed by the Board of Trade.

The superintendents of the Technical Elementary Schools, the professors in the Technological Institution, the superintendents of Chalmers' Polytechnic School, and of the School of Naval Architecture, as also the superintendent and the second master in the School of Mines, are appointed by the King.

The superintendents of the Technological Institution and the Polytechnic School in Stockholm, who are not of necessity bound to give instruction, are also appointed by the King.

The superintendent (who is at the same time head teacher) in the Elementary Mining School in Filipstad is appointed by the Board of Mines (Fullmægtrge l'Jerncontorest).

The qualifications demanded of the teachers are, first, full knowledge of the subject which they are to teach, and great capacity for teaching; and the qualifications are tested partly by certificates of competence, to be presented before appointment, and partly by practical trials in the schools. In general, the candidates have either passed University examinations, or have been pupils of the higher technical institutions, and have, moreover, acquired further practical knowledge.

11. The taste and skill evinced in industrial undertakings have certainly improved through the influence of the schools.

12. The facts that the number of persons who seek admission into the schools is constantly increasing, and that manufacturers and others engaged in industrial pursuits exert their influence in every diet to promote the increase or extension of technical educational establishments, are sufficient proof that the use of such schools is evident to the public, and duly appreciated.

Norway.

Abstract of Report on the Rural Schools in the Kingdom of Norway, in the years 1861, 1862, 1863.

(Translation.)

	Frs.
1. The revenues of the schools were—	
In 1861	1,205,380
In 1862	1,652,020
In 1863	1,947,471
2. The expenditure for the schools was—	
In 1861	1,005,203
In 1862	1,527,203
In 1863	1,900,141
Out of these sums were paid for—	
(*a*.) Salaries to schoolmasters—	
In 1861	583,200
In 1862	705,387
In 1863	775,719
(*b*). For purchases of land for schoolmasters—	
In 1861	30,055
In 1862	93,555
In 1863	100,733

For building and repairing and hiring schoolhouses— Frs.

In 1861	136,900
In 1862	326,170
In 1863	534,123

The remainder was expended in other incidental expenses, such as purchase and repairs of school furniture, board of masters, &c.

3. The number of school districts was—

In 1861	6,189
In 1862	6,310
In 1863	6,317

Of this number those having ambulatory schools were—

In 1861	3,620
In 1862	3,040
In 1863	2,757

In the remaining districts instruction was in every case given in stationary schools, in buildings belonging to the school, or hired for the purpose.

4. The number of children bound by law to attend the schools was—

In 1861	200,273
In 1862	201,266
In 1863	204,139

Of this number the children receiving instruction in stationary schools were—

In 1861	93,172
In 1862	126,683
In 1863	138,156*

During these three years the number of children below the age fixed by law for attendance at school, who took part in the instruction given in the district schools, was about 8,000 annually.

The number of cases of absence from school during the legally appointed time was—

In 1861	2,588,600
In 1862	2,782,600
In 1863	2,778,200

The time fixed by law for attendance at school is, according to the circumstances of the localities, from 12 to 9 weeks in the year.

The number of children who attended during the whole of the term fixed by law was—

In 1861	122,657
In 1862	156,210
In 1863	159,578

The number of those who did not attend during the entire term was—

In 1861	74,218
In 1862	41,731
In 1863	41,845

The report contains no statement of the subjects taught in the schools, nor is any indication given as to the means used for compelling attendance.

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* The absolute number of children attending the ambulatory schools is not given. But the numbers attending who had more than ¼ of a Norwegian mile to walk to the school are given as follows:—

1861	21,602
1862	18,103
1863	16,979

*Abstract of Tables accompanying Reports of Inspectors of Schools in the 12 Dioceses of Sweden, 1834—1866.**

Dioceses.	Number of schools.	Number of children above the age prescribed for attendance at school.	Number of children who, at the age of confirmation, were possessed of			Number of parish (socken) libraries.	Number of children entered on the school books.	Number of children present at last visit of Inspector.
			The minimum of knowledge.	Knowledge above the minimum.	Knowledge below the minimum.			
Upsala	506	50,894	2,490	1,308	2,428	172	24,542	21,451
Linköping	443	50,826	2,243	597	992	127	34,299	18,229
Skara	417	50,969	2,069	3,328	2,257	159	28,428	13,976
Strengnas	412	33,338	548	105	683	116	20,568	18,816
Westeros	707	50,733	2,136	1,923	2,017	97	33,262	12,735
Wexive	502	48,189	2,434	761	819	87	16,986	11,057
Lund	941	100,022	—	14,899	6,395	211	80,712	40,695
Goetheborg	606	69,418	2,051	1,619	8,963	64	52,208	21,520
Kalmar	152	25,424	433	284	491	35	5,544	3,473
Karlstad	513	66,331	2,345	920	3,794	130	42,510	19,770
Hernoesand	208	34,365	1,441	644	1,912	20	13,474	6,301
Wisby	90	7,334	—	460	397	47	5,596	4,208

* The tables make no distinction of years.

Sweden.

Abstract of Tables, &c.

(Translation.)

The popular schools in Sweden are divided into two classes, the popular schools and the minor or preparatory schools, in which the pupils acquire that rudimentary knowledge of reading, spelling, cipher-ing, writing, and Bible history, which it is thought desirable that they should possess before entering the popular schools, properly so called.

The subjects taught in the latter schools are: Bible history, cate-chism, correct reading in Swedish, orthography, and exercises in under-standing and properly using the language, history and geography, natural history, geometry and linear drawing, arithmetic, writing, singing, gymnastics and exercises in the use of arms, gardening and tree-planting. In many of the rural districts the schools are ambu-latory, on account of the great distances between the farms. The minor schools are also frequently mere substitutes for the higher schools in very isolated and thinly populated localities.

The school term is from 32 to 36 weeks in the year, and the daily school hours are six.

Paragraph 7 of the law for arranging the popular schools, prescribes that opportunities shall be afforded children who have left the schools to refresh their knowledge from time to time under the guidance of the teachers, or to pursue their studies further. As yet, however, very few pupils avail themselves of this privilege, and the teachers, whose work would be thus increased, do not show much inclination to encourage the habit, and the zeal of the local authorities is in many instances so lukewarm, that although the decree above alluded to says that children whose parents or guardians are too poor to afford to give them the clothing and food necessary for attendance at school, must be provided with these necessities by the guardians of the poor of the district. Such children are nevertheless frequently left entirely with-out any schooling.

However the inspectors maintain that the feeling of the mass of the people towards the schools, which five years ago was very hostile, is much improved; and it is found that where the schools are thoroughly efficient they are much frequented. Notwithstanding this, all the Inspectors, with one or two exceptions, complain bitterly of the irregularity of attendance at the schools. But, says the Inspector of the first district of the diocese of Upsula, "*this evil can hardly be cured by legislative measures*," and though none of the other Inspectors distinctly express the same opinion, none propose police interference, and all concur in maintaining that the remedy must be sought in improved school inspection, and a zealous superintendence, and a growing experience of the real benefits of education.

The support of the schools seems to depend partly on local rates, partly on government subsidies.

Belgium.

Report on Industrial Education, presented to the Legislative Chambers, 2nd April, 1867, by the Minister of the Interior (see page 87).

(Translation.)

Gentlemen,

I have the honour to present to you a report on the state of the

industrial and professional education organized with the assistance of the Government.

This document, computed from the annual reports of the commissions of superintendence, and from the information furnished by the inspectors, does not only show the actual position of industrial schools, properly so called, but also of other analogous institutions, in favour of which subsidies have been granted from the industrial funds.

These diverse establishments are classed in two categories; the first comprises the industrial schools at Bruges, Courtray, Ghent, Charleroi, the two Flandengs, Soignies, Tournay, Liege, Verviers, Huy, Serain, and Namur, the industrial school, and the mines of Hainault, the Industrial Museum, and the upper commercial institution of Antwerp. In the second category are comprised the workshops for apprentices established in Flanders.

As no general report has as yet been made concerning the industrial schools, the Museum of Industry, and the upper commercial institution, the present report states the condition of these establishments since their foundation, especially during the school years 1861–1862, 1862–1863, 1863–1864, 1864–1865, 1865–1866.

As to the workshops for apprentices, as already, at different times since their foundation, their condition has been made public, the report will be confined to stating the results obtained from the date when they were organized as permanent institutions for professional education by the Royal Decree of the 10th February, 1861. Nevertheless, in order to give a complete idea of the effects produced by these institutions since the crisis in the linen trade took place in the Flemish provinces, this report is preceded by a short historical summary of the facts which occurred from 1840 to 1860.

Chapter I.—Industrial Schools.

1st Section.—*Preliminary Observations.*

The utility of industrial schools cannot be denied. With respect to the labouring classes, they are the auxiliary, the indispensable complement to the primary schools. In fact, it is known that generally the children of workmen, on account of the necessity which their parents experience of taking advantage of their work, leave their schools for the workshop at the age of from ten to twelve. It follows that these children easily forget the little that they have learnt, and that, most frequently they do not possess any of the technical knowledge which is necessary for them in order to pursue properly the kind of work which each of them has undertaken.

The Industrial Schools are destined to supply these deficiencies. In these establishments young apprentices, and even adults, can complete their classical education, and obtain the knowledge which they may require in order to become skilled workmen, efficient foremen and overlookers, and even possibly good directors of factories.

The industrial schools, founded at different periods, some by means of the administrations of the communes, others initiated by private persons were organized in different ways.

The Government, whose assistance was solicited in aid of the expenses of these institutions, having remarked that nearly all were in need of improvement, either with regard to the discipline or the instruction, thought it better to induce the communal authorities to introduce various modifications in the rules of these schools, organizing

them on new bases, and as much as possible, according to an uniform rule.

This proposal, which in general was well received, had for result, for one thing, that those guarantees of good organization which the State has a right to require from all establishments to whom she grants subsidies, were inscribed in the rules, and for another to increase the sum of the advantages which the labouring class derives from them. Care was taken at the same time to take into consideration, in each school, the needs of the locality, in order that the scientific instruction might be appropriate to the different branches of industry carried on there.

2nd Section.—*Summary of the Regulations.*

Before giving an account of the organization and working of each of the schools founded with the assistance of the Government, it will be useful to give a sketch of the regulations which generally govern these institutions.

§ 1st.—*Subjects of Instruction.*

In general, the instruction comprises mathematics, in their application to labour, general and applied physics, general and applied chemistry, working mechanics, linear drawing, drawing as applied to labour, and the laws of health (hygiène).

Other subjects are taught according to the labour carried on in each locality, such as elementary mineralogy, the elements of metallurgy, the ground-work of architecture, ornamental drawing, modelling, industrial constructions, the theory of stone-cutting, the working of mines, the various processes of weaving, and the theory of woven fabrics.

Special classes for working engineers are annexed to several schools.

There are also taught in certain establishments the French language, the history and geography of the country, the rudiments of industrial and commercial bookkeeping; some have a preparatory school annexed to them where reading, writing, spelling, elementary arithmetic, and mensuration are taught.

With very few exceptions the instruction is gratuitous. The course of the studies is for two, three, or four years.

Each school is furnished with a library, a laboratory, and the apparatus necessary for instruction.

§ 2nd.—*Administrative Committee and Staff of Educators.*

Each school is placed under the superintendence of an administrative committee.

The educational staff consists of a director, professors, and superintendents.

In general, the director and the professors are named by the communal council, upon the recommendation of the administrative committee. These nominations are submitted for the approval of the Government, on the recommendation of the permanent deputation. But in some schools these nominations are made by the Government on the recommendation of the administrative committee, passing over the communal council. No absolute rule exists with respect to this. The mode adopted varies according to the end agreed upon in common by the State and by the commune, and the sacrifices made by each in order to attain it.

For the greater part of the schools the administrative committee consists of six or nine members nominated: a third by the communal council, a third by the permanent deputation of the provincial council, and a third by the Minister of the Interior.

In some schools half of the members of the committee are nominated by the communal council, and the other half by the Minister of the Interior, or by the permanent deputation of the provincial council. In this last case the nominations are submitted for approval to the Minister of the Interior.

The committee chooses from its own body a president and a secretary. Nevertheless a secretary may be chosen who is not a member of the committee. In this case he has no vote. The secretary can also fill the office of treasurer.

The governor, the burghermaster, or the alderman (*echevin*) representing him, is present, when he thinks proper, at the meetings of the committee. In this case, he presides, with a vote, and the power of giving a casting vote when the numbers are equal.

The administrative committee is completely renewed, half or a third going out every two or three years.

The committee advise on the nomination of the staff, and in the course of studies, makes regulations as to rules of order, subject to the approval of the communal council, and exercises a thorough supervision over the studies and the discipline.

The members of the committee visit the school whenever they think necessary, question, or cause the pupils to be questioned, and satisfy themselves as to the regular observance of the course of studies and of the carrying out of the regulations.

The Minister of the Interior and the permanent deputation cause the school to be inspected, whenever they think fitting, by functionaries delegated for that purpose.

At the end of the school year the members of the committee unite with the directors and professors in order to confer on the state of the school, and to point out, where necessary, the measures to be taken in furtherance of the institution. At the close of the conference, a report is addressed to the communal council, which transmits either the original or a copy to the permanent deputation, and the Minister of the Interior.

The director is charged with the superintendence of the studies, and the execution of the regulations with regard to instruction and discipline. The educational staff and the pupils are subject to him.

One of the professors can be nominated to the office of director.

The director visits the classes whenever he judges needful; regulates the employment of the time, and arranges, together with the professors, the courses of lessons. These courses are sent, with the opinion of the committee, for the approbation of the communal council, and the Minister of the Interior.

The staff of the school communicates with the administrative committee by means of the director who endorses with his opinion any requests or writings sent.

The professors cannot alter the causes of lessons, without being authorised, and they are bound to give their lessons on the days and hours fixed by the table for the employment of the time.

A professor prevented from giving his course may be provisionally represented by a person named by the directors. If the absence of the professors should last more than a fortnight, the appointment of the substitute is made by the administrative committee.

§ 3rd.—*Pupils.*

In general, in order to be admittd as a pupil, the candidate must be fourteen, or at least, twelve years old; must know how to read and write fluently, and be acquainted with the other subjects taught in the primary communal schools, or in the preparatory school annexed to the industrial school.

In certain schools an exception is made to this rule in favour of adults eighteen, twenty, and twenty-five years of age.

In some establishments it is requisite that the pupil should have attended, for two years, the classes of the drawing academy, or that he should possess the knowledge of drawing which is taught in these two years' classes.

The aptitude of the pupils is inquired into, before their admission, by the professors, specially assembled and presided over by the director.

Such persons who may make the request, may be authorised by the administrative commission to follow one or more courses of study without being obliged to be entered as pupils.

The examination for admission, on changing the classes, and on leaving, are made by writing and orally.

Nobody can be admitted to the classes of the second and third year of study, unless he knows thoroughly the subjects taught in the classes of the preceding year or years.

The examinations on leaving take place towards the end of each school year, in presence of a jury named by the administrative committee.

Certificates of proficiency are given to those who have distinguished themselves by their progress, and who pass a successful examination, either upon the subjects taught generally, or upon the subjects of the classes which they have been authorised to attend. At the close of each school year, prizes consisting of books, mathematical instruments, &c., are awarded to those pupils who have most distinguished themselves by their application, their progress, and their good conduct.

§ 4th.—*Receipts and Expenses.*

The expenditure is fixed each year by the administrative committee It is submitted for approval to the communal council and the Minister of the Interior.

The accounts comprise:

a. Receipts:

1st. The subscription of the commune.

2nd. Subsidies from the province and the State.

3rd. Miscellaneous receipts.

b. Expenses:

1st. Salaries.

2nd The sumsnecessary for keeping up and improving the educational apparatus, the collections, and the library.

3rd. The cost of warming and lighting.

4th. Small expenses, the cost of the office, and of the prizes distributed to the pupils.

The sums received are placed in the communal treasury.

The expenses are defrayed by orders audited by the president of the administrative committee, countersigned by the secretary, and paid by the communal treasurer.

The accounts are given every year to the communal council, and submitted for approval to the Minister of the Interior.

Chapter II.—Industrial Education, First Division.

1st Section.—*Industrial School of Bruges.*

Foundation and aim of the Institution.

The Industrial School of Bruges was founded in 1855. It was at first annexed to the Academy of Fine Arts, that is to say that oral lessons of arithmetic, geometry, mechanics, and physics, applied to industrial arts and agriculture, were added to the drawing classes given in that establishment.

In 1861, the school was organized on new bases and separated from the Academy of Fine Arts, so as to form a distinct establishment.

This school, founded by the commune, with the assistance of the province and of the State, has for its aim to instruct young workmen and artisans in the branches of knowledge the most indispensable for the carrying on of arts and trades in general.

Subjects of Instruction and Educational Staff.

The instruction divided into three years of study, comprises arithmetic, geometry, mechanics, physics, industrial chemistry, and industrial drawing.

The lessons are given each evening from 6 to 8 o'clock; on Sundays, the lessons are given from 9 to 11 o'clock.

The lessons of arithmetic, geometry, mechanics, physics, and chemistry last regularly one hour. The lessons of drawing alone, last sometimes one hour, sometimes two hours, the pupils devoting to drawing all the time which is not employed on other subjects. The classics are arranged in such a manner that there is only one scientific lesson a day.

The educational staff is comprised of a director, four professors, and one superintendent.

Pupils.

According to Article XXIV. of the Regulations of the School, nobody is admitted as a pupil, under the age of fourteen years at the lowest, unless he can read and write correctly, and is acquainted with the four first rules of arithmetic, nor unless he has attended, for two years at least, the classes of the drawing academy. Thus, we may say that primary communal schools, on the one hand, and the drawing academy on the other, prepare the pupils to follow with advantage the industrial instruction.

The classes of geometry were attended, in 1862-63, by 22 pupils, and in 1863-64 by 21 pupils; two hours of lessons have been devoted to them every week.

The number of pupils attending the class of mechanics regularly has been 9, in 1862-63, and 20, in 1863-64.

The classes of physics and chemistry have been regularly given during the school year 1863-64; three hours have been devoted to them every week. During the school year 1864-65; the number of pupils who have attended this class regularly has been 74.

On the 1st November, 1865, the pupils were classed in the following manner:—

Drawing class..	1st year	39	74
	2d year	26	
	3rd year	9	

Class of mathematics ..	lower division 37 upper division 22	59
Class of mechanics	lower division 22 upper division 11	33
Class of chemistry and physics		30

The pupils admitted to attend the classes during the school year 1865–66, have been classed as follows:—

Drawing class..	1st year 31 2d year 32 3rd year 19	82
Class of mathematics.. ..	lower division 32 upper division 37	69
Class of mechanics	lower division 32 upper division 18	51
Class of chemistry and physics	lower division 32 upper division 19	51

In this classification all the pupils are not comprised, but only those who have attended the classes regularly and diligently.

The pupils in their first year of study, to the number of 31 are those who have attended the lessons most assiduously. Their progress in mathematics, as well as in drawing is very satisfactory.

The pupils of the second year to the number of 32, more generally incapable of following successfully the courses of mechanics, of physics, and of chemistry. The greater part of them were obliged to go over these courses again.

The third year of study, composed of 19 pupils, is the best of all the courses.

The class of industrial drawing is the one which has been attended by the greatest number of pupils: 62 in 1862–63, 72 in 1863–64, 74 in 1864–65, and 82 in 1865–66.

A course of practical steam engineering has been given, every year, on Sundays, from 9 to 11 o'clock. At first 5 pupils attended the lessons; but soon this number was raised to 14. These lessons have been illustrated by a model of a steam-engine placed for this end in the laboratory of the chemical class.

In order to render these lessons more profitable, the professor has taken his pupils successively into the different factories in the town, which has allowed them to compare one with another the different construction of engines.

This course, specially destined for the young people who purpose to become head workmen, foremen, or engineers, is calculated to produce good results.

General Observations.

Rewards consisting of medals, and mathematical instruments, have been awarded to these pupils who have distinguished themselves by their good conduct, their application, and their attainments.

In general, the pupils have been noted for their emulation, and they have made real progress. Some of them, employed in the factories in the term, have had an opportunity of applying the knowledge gained at the school.

Since its reorganization the institution has worked in a satisfactory manner. Every day its benefits have been better appreciated by that class of society which is more directly intended to profit by them. There is a proof of this in the constantly increasing number of pupils, as well as in the requests for admission made by the heads of factories in favour of their most intelligent young workmen.

2nd Section.—Industrial School of Courtray.

Foundation and Aim of the Institution.

The Industrial School of Courtray, to which is joined the Academy of Drawing and Architecture, was founded by a decree of the communal council, with the assistance of the province and the State, which each contribute a third of the expenses.

The aim of this institution is to furnish industrial workmen with the acquirements they need, in order to carry on their professions more profitably.

The regulations of this school, adopted by the communal council, on the 24th March, 1866, were approved on the 3rd November following, by the Minister of the Interior.

Subjects taught, and Educational Staff.

The school is divided into two sections; the industrial section, and the section of fine arts, and architecture.

The industrial section comprises:—

The drawing of arabesques, and of the figure, and the outline of machines, arithmetic, geometry in its application to industry, the elements of physics, of mechanics, and of chemistry, and the application of these sciences to the special manufactures of the town of Courtray.

The section of fine arts and architecture comprises:—

The drawing of arabesques, of the figure, and of architecture; drawing from plaster casts, from the antique, and from life; the outline of plans, and the composition of architecture, arithmetic, geometry, and its application to construction, the elements of physics, and mechanics, and the application of these sciences to the knowledge of materials and of construction in general.

The instruction in these different branches of study is spread over three years.

The two first years of study, comprising linear drawing, arabesque, drawing, and figure drawing, arithmetic, and geometry, the elements of physics and of mechanics, are common to the two sections.

The third year of study comprises:—

a. For the industrial section: the drawing of machinery, chemistry, and the application of scientific knowledge to the special manufactures of Courtray, such as weaving, spinning, bleaching, dressing, dyeing, &c.

b. For the section of fine arts and architecture: drawing from plaster casts, from the antique, and from life, perspective, the drawing of plans, the composition of architecture, modelling, the application of geometry, of physics, and of mechanics to the knowledge of materials and of construction in general.

Unless by a special decree of the communal council, all these classes are gratuitous.

The time and the length of the classes are fixed, as much as possible, so as to allow the pupils of the academy of drawing and fine arts to attend them.

A library, a laboratory, and the necessary apparatus complete the educational requirements of the school.

The educational staff is composed of a director, who is professor of mechanics, a professor of physics and chemistry, a professor of drawing, arabesques, and machinery, a professor of arithmetic and geometry, a master to prepare for the scientific classes, and a superintendent.

The institution of the school is of too recent a date to allow of any information being given as to the results of the instruction.

3rd Section.—Industrial School of Ghent.

Foundation and Aim of the Institution.

The Industrial School of Ghent was founded during the last years of the Kingdom of the Netherlands; but it is only since 1834, a period when it was organized on new bases, that it has greatly increased in efficiency.

In 1860, this institution underwent a new reformation, and on this occasion it was united to the Special School of Industrial Designs and of Weaving, which was founded at Ghent, in 1852, with a view of forming good designs, and good master weavers.

Subjects of Instruction and Educational Staff.

Article 1.—Scientific Instruction.

The instruction comprising four years of study is arranged in such a manner that the pupils can prepare themselves either for chemical pursuits, or mechanical arts, for the work of textile design, or industrial design.

The branches of instruction are divided as follows:—

1st year.—Mathematics, descriptive geometry, linear and ornamental drawing, bookkeeping.

2nd year.—Mathematics, physics, mechanics, drawing of machinery, ornamental drawing.

3rd year.—Mechanics, chemistry, spinning, weaving, steam machinery, drawing and putting up of machines, ornamental drawing, composition.

4th year.—Chemical technology, dyeing, bleaching, printing, practical weaving, analysis of specimens, putting up of machinery, ornamental industrial drawing, industrial economy.

A special course for working engineers has been organized since the school year 1856–1857. The lessons are given in the Flemish language, on Sundays, so as to allow persons at a distance from the place to attend them.

The educational staff, for the scientific subjects, is composed of eight professors, and of two assistant professors, for the evening classes of linear drawing; of two professors for the classes of industrial design and of weaving.

All the classes are given regularly according to the plan laid down by the school officials, and approved by the Minister of the Interior.

The general classes are given in the two languages.

A class of photography, founded by way of trial, in 1861–1862, has been definitely introduced into the plan.

In 1861–1862, the class of industrial examining has been regularly attended in winter, by the pupils of the French division. It has not been given in Flemish for want of hearers.

Each scientific course comprises, in general, two lessons a-week during the six months of winter. The Flemish courses last all the year, and are given generally on Sundays and Mondays. The chemical course comprises three lessons a-week in winter and two in summer, besides two hours devoted to experiments.

The theoretic course of weaving is given all the year round, three lessons a-week; the course of ornamental design is also given all the year round, for five hours a-day in winter, and eight hours a-day in summer. It must, however, be remarked, that during the first two years of study, some pupils attend the schools of design for half the day, and for the other half-day the weavers' workshop.

During the school year 1861–1862, classes for machine and orna-

mental drawing, properly that of the composition of ornaments, have been founded.

The progress of these classes has been satisfactory during 1863 64, only the class of ornamental composition has been attended by a relatively limited number of pupils.

No study takes place at the school, because the pupils, excepting those who attend the special classes of ornamental design, are almost always employed at work during the greater part of the day. It is, therefore, in their own homes that they must study the subjects taught.

Article 2.—Practical Professional Instruction.

The section of industrial design and of weaving consists of two classes, that of industrial design, and that of technology and weaving.

The first of these classes has for its object the making of designs for carpets, paperhangings, cotton prints, foulards, shawls, laces, embroidery, and all kinds of figured and damasked stuffs. The pupil who completes his studies in it is in a position to occupy himself profitably in all the applications of the art of design to those different branches of industry where form constitutes an element of nature.

The class of technology and weaving comprises the description:—1st. Of all preliminary operations of weaving, such as winding the bobbins, preparing the warp, mounting and rolling up the warp; 2ndly. Of the apparatus employed in these operations, for hand-loom as well as for power-loom weaving; 3rdly, The preparations of the weft, winding on bobbins and on spools, dressing, and the necessary apparatus for this; 4thly. Of all the parts of the ordinary loom; 5thly. Of the interlacing of the threads; 6thly. Of looms for plain weaving; 7thly. Of the little Jacquard, called the draw loom; 8thly. Of the Jacquard apparatus; 9thly. Of raised weaving; 10thly. Of the arrangement of the cards; 11thly. Of the setting of the patterns, and the apparatus necessary for this operation; 12thly. Of the weaving of damasks, dimity, figured stuff, chinés, velvets, &c.; 13thly. Of the power-loom. Examples are also given of calculations for the manufacture, and the course finishes by the statement of some finishing processes.

When the professor thinks the pupils sufficiently advanced in their studies, he gives them specimens of stuffs to be analyzed, in order that they may describe the proper processes for producing them.

A warping-frame, a common loom for cloth, a loom for damasks, a loom for piqués, a set of patterns and cards are furnished for the use of the pupils, that they may practise themselves under the guidance of a foreman and the direction of the professor.

Having completed their studies, the pupils are quite proficient in the different branches of industrial design. They execute on commission, and for their own profit, designs for the manufacturers.

As to what concerns the weaving, as has been stated above the pupils perform all the operations connected with it, from the design to its execution in the loom. They analyze and reproduce themselves in woven fabrics all kinds of specimens of stuffs, from the most simple to the most complicated. They acquire thus a complete and minute knowledge of everything relating to the production of textile fabrics, those made by plain weaving, as well as those made by means of the Jacquard apparatus.

A drawing class for ladies was opened in the month of December, 1863. This new institution has been very much appreciated. Although the greater part of the pupils entered did not possess any idea of drawing, some of them have made remarkable progress, which leads us to

hope that they may, by means of their work, earn for themselves an honourable subsistence.

Lessons on the use of sewing-machines have also been instituted for girls. Elsewhere some knowledge is given to these pupils on textile manufactures in their relation to the making of designs; later a course of photography, and a course in which will be exhibited the different applications of electricity to the possible employments of women, will be added to this instruction.

Pupils.

Since the year 1856–1857, the average number of pupils admitted to attend the classes has been 900.

At the opening of the school year 1861–1862, the entries were distributed as follows:—

General Classes.	Pupils.
Linear and machinery drawing	308
Section of mechanics (Flemish division)	386
Section of chemistry	44
Section of textile manufactures	56
Section of mechanics (French division)	140
Section of chemistry	76
Total ..	1,010
Special Classes.	
Ornamental designing	28
Practical weaving	17
Management of steam-engine	11
Photography	95
Total ..	179
By Tickets of Admission.	
French courses	33
Flemish courses	13
Total ..	46
Grand Total.	
Pupils entered, general classes	1,010
„ special classes	179
By tickets of admission	46
Total ..	1,235

However, it is proper to remark that if these figures represent approximately the numbers present at the different classes of the school, it is necessary in order to obtain the real number of persons who have attended the teaching of the institution, to deduct for those attending more than one class, and also to take into consideration those requests for admission which it has not been possible to grant.

After making these different deductions, there remain	Pupils.
for the general classes of the Flemish section ..	410
For those of the French section	190
Pupils admitted to some only of the general classes ..	98
Different special classes	146
Tickets of admission	16
Total ..	890

That is, a total of 890 persons, who, during the school year, have attended, either as pupils or as hearers, one or several of the classes of the school.

Classed according to age, the pupils of the general classes are distributed as follows:—

	Flemish class.	French class.
From 14 to 17 years old	137	94
„ 18 to 20 „	129	57
„ 21 to 23 „	63	20
„ 24 to 26 „	23	11
„ 27 to 30 „	24	6
Above 30 years of age	34	2
Totals ..	410	190

The classification by profession gives:—

Flemish Division.			French Division.	
Fitters	62		Artisans and Clerks	53
Iron Turners	15	180	Draughtsmen and Mechanicians ..	19
Mechanicians	30		Students	33
Smiths, Locksmiths ..	73		Teachers	5
Working Engineers		20	Officers and Subalterns	20
Carpenters, Cabinetmakers ..		46	Various professions	60
Various professions		151		
Without any known profession ..		13	Total	190
Total		410		

The number of pupils and free hearers who attend the different classes, during the school year 1862–1863, amounts to 1060. These figures are classed as follows:—

General Classes in Flemish.

	Pupils.	
Mechanical industries	414	
Chemical	48	
Textile	68	
Ornamental design	22	
		552

General Classes in French.

Mechanical industries	103	
Chemical	73	
		176

Special Classes.

Working engineers	71	
Photography	121	
Machine drawing	92	
Industrial drawing day class	30	
Practical weaving	18	
		332
Total ..		1,060

The class for machine drawing, opened on Sundays, reckons 265 pupils entered, of which about 55 have not been able to be admitted for want of room.

The classification by profession gives:—

Flemish Division.		French Division.	
Fitters	72	Artisans, Foremen, and Clerks	55
Iron Turners	23	Designers, Mechanicians, &c.	30
Mechanicians and Setters	42	Teachers	3
Black and Lock Smiths	93	Subalterns and Soldiers of the Engineers and Artillery	12
Working Engineers	7	Students in the Schools of the State	31
Carpenters and Cabinet Makers	57	Various professions, and those without any profession	45
Artists and Sculptors	33		
Various professions	33	Total	176
Dyers, Bleachers, Plumbers	107		
Without profession	18		
Total	452		

According to age the admission of the pupils may be classed as follows:—

	Flemish courses.	French courses.
From 14 to 17 years of age	134	65
„ 18 to 20 „ „	150	66
„ 21 to 23 „ „	92	23
„ 24 to 26 „ „	35	11
„ 27 to 30 „ „	25	8
Above 30 years of age	16	3
Total	452	176

This classification is not applicable to the special classes for photography, and working engineers, where the pupils have attained or passed 20 years of age.

During the school year 1863–1864, the number of pupils entered for the various classes of the school amounted to 1,027, viz.: 678 for the Flemish division, and 349 for the French division. Of this number 555 attend the general Flemish classes, and 193 the general French classes.

The Sunday drawing class has been attended by 268 pupils, admitted in succession; the addition of some tables has allowed of our increasing the number of plans to be disposed of, from 210 to 225. In the interest of the studies, and of the progress of the pupils, this class has been divided into four sections.

The pupils of the general classes were classed according to profession in the following manner:—

Flemish Division.		French Division.	
Fitters	64	Artisans, Foremen, and Clerks	30
Iron Turners	18	Draughtsmen and Mechanicians	23
Mechanicians and Setters	44	Teachers and Normal Teachers	8
Blacksmiths, Locksmiths, and Plumbers	188	Pupils of the Middle and Upper Schools	66
Working Engineers	7	Various professions	36
Carpenters and Cabinet Makers	71	Without any known profession	30
Painters and Sculptors	20	Total	193
Various professions	102		
Without any known profession	41		
Total	555		

The classification by age gives the following result:—

	Flemish division.	French division.
From 14 to 17	237	67
„ 18 to 20	134	66
„ 21 to 23	84	31
„ 24 to 26	44	16
„ 27 to 30	28	6
Above 30 years of age	28	7
Total ..	555	193

In the classes for photography, and in those for working engineers, the pupils are generally of a more advanced age than in the general classes.

The special classes have been attended as follows:—

	Pupils.
The class for machinery drawing, in the evening by	85
„ industrial drawing ditto ..	35
„ industrial drawing ditto ..	22
„ practical weaving	21
„ photography	85
„ working engineers	16
„ drawing for ladies	15
Total	279

Which brings to 1,027 the number of persons entered on the books, and who have attended one or more classes in the school.

The classes have in addition been attended by auditors admitted free, the number of whom has varied from 80 to 110.

In 1864–1865 the number of pupils entered for the different classes amounted to 1,107, viz.:—

	Pupils.
General Flemish classes	531
„ French	199
The special classes have been attended as follows:—	
Machinery drawing, day classes, by	132
Not attending any other class:—	
Machinery drawing, evening classes	93
Industrial ditto ditto	22
Preparatory class ditto	16
Practical weaving	28
Industrial drawing day class	6
Working engineers	15
Photography	55
Ladies' class	40
Total.	1,107

The pupils of the general classes were classified according to age and profession as follows:—

Flemish Classes.

Ages.		Professions.	
From 14 to 17	229	Fitters	55
„ 18 to 20	137	Iron Turners	29
„ 21 to 23	70	Mechanicians	36
„ 24 to 26	48	Blacksmiths, Locksmiths, and Engineers	113
„ 27 to 30	23	Carpenters	4
Above 30 years	24	Cabinet Makers, &c.	67
Total	531.	Various professions	209
		Without any profession	18
		Total	531

French Classes.

Ages.		Professions.	
From 14 to 17	89	Manufacturers and clerks	37
„ 18 to 20	57	Draughtsmen and Mechanicians	25
„ 21 to 23	28	Students	80
„ 24 to 26	11	Teachers	2
„ 27 to 30	12	Various professions	36
Above 30 years	2	Without any profession	19
Total	199	Total	199

The class for machinery drawing, which has been given on Sundays, has been attended by 228 pupils, of whom 102 attend no other lessons.

The number of pupils who have attended one or more classes during the school year 1865–1866, amounts to 1,277, and is subdivided as follows:—

	Pupils.
General Flemish classes	522
„ French „	235
Sunday drawing class, deducting those attending other classes	93
Evening drawing class	108
Day industrial drawing class	8
Evening industrial drawing class	21
Preparatory drawing class	23
Weaving and spinning class	46
Working engineers' class	30
Photography class	59
Ladies' drawing class	11
Sewing-machine class	118
Total	1,277

The Sunday drawing class has been attended by 243 pupils; their admission has only been able to take place in succession, the number of drawing tables only amounting to 218.

The classification of pupils by age and profession, gives for the general classes the following results:—

Flemish Classes.

Ages.		Professions.	
From 14 to 17	301	Fitters	68
„ 18 to 20	111	Iron Turners	28
„ 21 to 23	39	Mechanicians	27
„ 24 to 26	35	Black and Lock Smiths	84
„ 27 to 30	16	Working Engineers	8
Above 30 years	20	Carpenters and Cabinetmakers	66
Total	522	Various professions	223
		Without any profession	18
		Total	522

French Classes.

Ages.		Professions.	
From 14 to 17	105	Artisans and Clerks	51
„ 18 to 20	57	Draughtsmen and Mechanicians ..	10
„ 21 to 23	38	Fitters	2
„ 24 to 26	19	Students	49
„ 27 to 30	7	Teachers	5
Above 30 years	9	Various professions	88
		Without any profession	26
Total	235	Total	241

Certificates of Proficiency.

At the close of the school year 1861–62, examinations took place for the giving of certificates of proficiency to engine-drivers, working engineers, and for pupils of industrial chemistry. Thirty-two candidates had entered their names to undergo the first of these examinations; of this number two passed with great credit as engine-drivers: three obtained the certificate in question in a satisfactory manner, and sixteen obtained certificates as working engineers. For the rank of pupil of industrial chemistry, two candidates presented themselves: one was admitted with great credit, the other was turned back.

The juries charged with the delivering of certificates of proficiency were composed, besides the professors of the school, of one or two members of the administrative committee, of manufacturers and of officials belonging to the highway board (hauts et chaussées), or to the high school.

At the close of the school year 1862–63, the several juries proceeded again with the examinations: of thirty candidates entered to undergo an examination as engine-drivers, one obtained the rank with great credit, and six in a satisfactory manner; eight obtained certificates as working engineers.

Two pupils passed, one with great credit, the other in a satisfactory manner, the examination as pupils is industrial chemistry.

With the consent of the director of the school, the administrative committee, using the power granted to them by the regulation of the competitions and examinations, has substituted the certificate of working engineer for that of engine-driver.

At the close of the school year 1863–64, eighteen pupils presented themselves for examination to obtain certificates of proficiency, viz.:

Five as pupils in textile industry; one as pupil in mechanics; one as pupil in chemistry; twelve as working engineers.

The several examining juries have given the following certificates: one as pupil in mechanics, with very great credit; one as pupil in chemistry, with great credit; two as pupils in textile industry, one with great credit, and the other in a satisfactory manner; and five as working engineers in a satisfactory manner.

One candidate entered for examination in textile industry was turned back after the theoretic examination, another after the practical examination.

Four candidates entered for examination as working engineers were turned back; one did not appear.

In 1864–65, the juries had to pronounce on the merits of five candidates to the title of pupil of textile industry, and of six to the title of working engineers; three obtained certificates as pupils of textile industry, two were turned back, six obtained certificates as working engineers.

In 1865–66 only the pupils in the class for working engineers

underwent an examination for the obtaining certificates of proficiency. Of seventeen pupils entered, two did not appear, one withdrew, eleven were turned back, and four were admitted.

Scientific Apparatus and Library.

The collections and the apparatus designed for the purposes of instruction are abundant, and receive every year considerable additions, so as to satisfy all the requirements of the classes and to keep on a level with industrial inventions and improvements. In the acquisition of new instruments the practical application of science to industry is always taken into consideration; as much as possible the most perfect models are chosen as objects of demonstration. Thus the acquisition has been made of a complete collection of instruments for measuring, surveying, and levelling; of approved apparatus for the course of photography, especially of an apparatus for photographic magnifying, invented by Mr. Van Monckhaven, an old pupil of the school; of a telegraphic apparatus of Morse; of an electro-machine applied to pumping. The acquisition has also been made of an apparatus for spectral analysis of Kincheff and Bunsen; of bellows with a constant current for acoustic experiments, of a series of apparatus for demonstrating the laws concerning the stability of equilibrium in bodies, &c.

The Industrial Museum has also been enriched by several collections representing the series of transformations of materials employed in industry.

The apparatus for the practical weaving course was urgently in need of improvement. Several looms, which came from the supposed workshops for apprentices, have been replaced by new looms, of which one is on a system which replaces the cards, and the patterns placed in these by the cutting out in wood of the figure to be woven; the acquisition has also been made of an iron power-loom designed for the weaving of stuffs for trousers, figured, and in several colours. We have provided for the replacing of several Turquard apparatus. A small steam boiler with its accessories has been obtained for the operations of bleaching, dyeing, &c. Lastly, the girl's school has been provided with two sewing-machines: one German, on a very simple plan, the other American, with all the needful accessories.

The number of models for drawing is also considerable. A museum has been formed of designs composed by the pupils, and of stuffs executed from those designs, either in the workshops of the school itself, or in other factories. Among the latter are some very fine specimens of carpets. These collections, when better known, will cause the artisans to appropriate better all the advantages they can derive from the knowledge and practical aptitude of the pupils taught in the industrial school.

The class for ornamental drawing, and for the composition of ornaments has not been neglected; the number of plaster models has also been augmented by the acquisition of several models in bas-relief and in alto-relievo.

There exists a library at the school which has added to it every year all the essential works upon applied sciences, and numerous periodical publications; the whole is constantly at the disposal of the pupils and workpeople, and enables them to keep themselves informed of any inventions made, either in Belgium, or abroad in the various branches of industry.

Every evening, a considerable number of readers, pupils or artisans, make use of the reading-room. Many works are consulted on the

spot, independently of the periodical publications, in Flemish, French, English, or German, upon the applied sciences.

The number of books borrowed from the library during the school year 1865-66 has been 2,490, viz.:

	French.	Flemish.	Total.
Chemistry and Chemical Arts	290	157	447
Physics	96	141	237
Mechanics	159	209	348
Mathematics	97	146	243
Technology	500	715	1,215
Totals	1,122	1,368	2,490

This taste for reading is a happy symptom in the working classes, especially when we consider that the library is exclusively composed of works on science and technology, and that the greater part of the readers are young people who, employed in the workshops, must take from their hours of recreation, the time necessary for their instruction.

General Observations.

From the preceding report, it is seen that the Industrial School of Ghent strives to answer more and more to the object of its institution, and that none of the improvements which can be usefully introduced are neglected. Success has crowned these efforts.

The institution renders incontestable service to the town of Ghent, where there is more than one master manufacturer whose whole professional education has been received at the school. Many other pupils, in the more humble positions of directors or foremen are useful to industry in general.

The town of Ghent, besides, is not the only one which profits from the good results of the institution. Several pupils, especially those who have obtained diplomas, have obtained honourable employment in the other localities of the country. The mills of Alost, St. Nicholas, and Tournay derive advantage from the artistic inventions of the pupils of industrial drawing, and several of these latter have obtained lucrative situations with the decorative painters of the capital. A pupil of the weaving class has entered as foreman in one of the large carpet manufactories of the country. Old pupils of the school have also been employed in mounting fabrics of damasked stuffs. It is thanks, to the school of Ghent, that many manufacturers can dispense with having recourse to the foreigner either for the needful designs, or even for the carrying on of their factories.

4th Section.—Industrial School of Charleroi.

Foundation and Aim of the Institution.

The Industrial School of Charleroi existed at first under the denomination of school for head workers of mines (*Ecole du porions*). Founded by a resolution of the Provincial Council of Hainault, dated the 16th July, 1845, and, annexed to the communal high school, this institution was specially designed to form overlookers and head workmen in mines (*maîtres ouvriers mineurs*).

The instruction was divided into two distinct sections.

The first, designed solely for the working class, comprised: arithmetic, practical geometry, the elements of descriptive geometry, necessary for stone-cutting and carpentery, mechanics, the working of mines, linear drawing, industrial drawing and their application to the

making of plans, to industrial constructions, to mechanics, and to the plans of mines. This section was attended by an average number of from 60 to 70 pupils, and in order that it might be accessible to a greater number of workpeople, the classes were given on Sundays from 8 o'clock in the morning till noon, and on Mondays, Wednesdays, and Fridays, from 5 to 7 o'clock in the evening.

The lessons of the second section, which comprised: physics, chemistry, mineralogy, geology, and natural history, more regularly given in the day time, and they were attended by an average number of from 35 to 40 pupils, of whom about half attended the high school.

The expenses of this institution were defrayed by the town and by the province; the latter contributed 4,000 francs every year, and the town 3,000 francs.

In 1864, in order to improve the position of the school, the pecuniary assistance of the State was requested. The Government, after having obtained all the requisite information, announced that this assistance would be granted on condition that the institution should undergo a complete reform, and be reorganized as a genuine industrial school, upon the plan of other institutions of the same kind, founded in other towns, with the concurrence of the State.

The commercial administration, in accordance with the recommendations given by the Government, adopted, on the 9th of January, 1865, an organic regulation which was approved by the Minister of the Interior on the 7th of the following February.

Subjects of Instruction and Educational Staff.

The instruction comprises the French language, commerce and bookkeeping, elementary mathematics, and descriptive geometry, in their application to industry, physics, and industrial mechanics, constructions, the working of mines, drawing applied to industry.

There is also a special class for working engineers (*chauffeurs*).

The duration of the studies is for three years.

The educational staff consists of: a professor of the French language, a professor of commerce, a professor of arithmetic, who likewise gives the lessons in mechanics, a professor of geometry, a professor of physics, a professor of drawing, and a doorkeeper.

Pupils.

The number of names entered amounted, on the 31st December, 1865, to 520, divided as follows among the various classes:—

1. *Week-day classes.*

	Pupils.
First year	81
Second year	7

2. *Sunday classes.*

Arithmetic	195
Geometry	80
Physics and mathematics	20
Working of mines	56
Figure and ornamental drawing	69
Drawing from the round	8
Modelling and carving of ornaments	4
Total	520

Among these pupils there are 30 who, attending several classes, are entered on several books, and who ought to be deducted from the total, in order to know the real number of pupils in the establishment. This leaves 490 pupils.

We must remark that the Sunday classes, although optional, are much better attended than those on the working days. The reason is that the greater part of the school pupils belong to the neighbouring communes of Charleroi. Of the number of 490 pupils, this town only furnishes 64; the other pupils inhabiting, for the most part, communes distant from the site of the institution, cannot attend the evening classes regularly.

The examination of the pupils of the old school for miners and overlookers, gave the following result:—*Section of miners:* 10 pupils entered, 7 admitted, 3 turned back. *Section of overlookers:* the three pupils entered have been admitted. *Section of artisans:* 8 pupils entered, 7 admitted, 1 turned back.

For the school year 1865—1866 the number entered has risen to 690, divided as follows among the different classes:—

1. *Week-day classes.*

	Pupils.
Pupils of the 1st year	137
Do. of the 2nd year	7

2. *Sunday classes.*

Arithmetic	278
Geometry	92
Physics and mechanics	20
Working of mines	61
Figure and ornamental drawing	80
Drawing from the round, modelling, and carving of ornaments	15
Total	690

The examinations for promotion took place in the presence of a jury composed of the director and the professors, and presided over by a member of the committee of management; 14 pupils entered to undergo these examinations: 3 were admitted to the third year of study, 4 to the second, 5 were turned back, and the two others were allowed to undergo, on the recommencement in October, a supplementary examination upon certain subjects on which they had not given complete satisfaction.

As there were no pupils of the third year, there was no need of proceeding to the examination for certificates of proficiency.

The result of the examinations undergone by the pupils of the Sunday classes, was as follows:—

Section of miners: 17 pupils entered, 8 admitted, 3 turned back.

Section of overlookers: the 3 pupils entered have been admitted.

Section of artisans: 9 pupils entered, 7 have been admitted, 2 turned back.

5th Section.—Industrial School of the Two Hendengs.

Foundation and Aim of the Institution.

This school, founded by a resolution of the Communal Councils of Hendeng-Aimeries, and Hendeng-Geognies, dated the month of July, 1864, is situated in the first of those communes.

It is designed to form overlookers and head miners for the mining works, as well as overlookers and skilled workmen for the metallic works.

The organic regulations of this school, adapted by the aforenamed Communal Councils on the 8th September, 1864, were approved, on the following 22nd November, by the Minister of the Interior.

Subjects taught and Educational Staff.

The instruction comprises: arithmetic, weights and measures, practical geography, industrial physics and mechanics, industrial constructions, the elements of applied geometry, the working of mines, drawing, and its applications.

The course of study lasts two years. The eduucational staff is composed of a director, also professor of drawing, a professor of mathematics, a professor of physics, of industrial mechanics, and of mining.

The school possesses collections of models, and the necessary apparatus for instruction.

Pupils.

During the school year 1865-66,216 pupils attended the following classes, viz.:

	Pupils.
Arithmetic	55
Practical geography	55
Mechanics and physics	28
Working of mines	14
Drawing	64
Total	216

It is to be remarked that a great number of the pupils attend several classes, and that the real number of pupils in the school is reduced to 79.

General Observations.

In spite of the obstacles and difficulties which almost always attend the first beginning of an establishment, the first school year has had abundant good results. The pupils, who for the greater part, had left the primary school, before they had completed their education, have made satisfactory progress, and several of them have already found, in the knowledge they have acquired, the means of rendering their work more productive.

6th Section.—Professional School of Soigneis.

Foundation and Aim of the Institution.

This school, especially designed to form good workmen, and skilled dressers, for working in stone, was founded in 1859.

As it may be said that the local industry consists solely in the working of stone quarries, without excluding all general subjects from the instruction, it has been thought useful to devote it particularly to the class of workmen who carry on this trade.

Subjects of Instruction and Educational Staff.

At the opening of the school year 1861–62, two preparatory classes, an arithmetic class, and a drawing class were added to the school. In order to gain admittance to these classes the pupil must be able to read and write fluently, have a slight knowledge of arithmetic, and have studied ornamental drawing for a year at least.

Five lessons of an hour each a week, and devoted to the arithmetic class, and four lessons of two hours each to the drawing class.

The instruction of the professional school, comprises a repetition of the arithmetic class in the preparatory school, practical and applied geometry, an elementary knowledge of physics and mechanics, the principles of architecture and drawing of ornaments from the round, the theory of stone-cutting and modelling.

These subjects occupy two years of study.

The lessons are given in the evening from 6 to 8 o'clock in winter, and from 8 to 10 o'clock in summer.

On Sundays from 9 to 10 o'clock in the morning, for the theory of stone-cutting.

The school of design is opened all the year, on Sundays from 8 to 11 o'clock in the morning; the lessons of this day allow those workmen who are too far from the town to be able to attend the evening classes, to obtain some knowledge of drawing.

The educational staff is composed of a director, a professor of mechanics and physics, a professor of arithmetic for the preparatory class, a professor of arithmetic and geometry for the class of the first year's study, a professor of stone-cutting and drawing, a professor of drawing and modelling, and a superintendent.

The instruction being addressed to workmen but little educated, and whose intelligence is scarcely developed, the professors strive to render it practical, and to do away with theoretical difficulties. They always assure themselves that the pupils remember the subject of the preceding lesson, and, if necessary, they make them go over the needful repetition in order to engrave it on their memories.

This school apparatus is sufficient; it is only necessary to provide every year for its being kept up.

The middle class school places at the disposal of the professional school its instruments for physics, mensuration, and levelling. The classes of these institutions being given in the same locality, and by the same professors, it is not indispensable that each of them should have private collections of these objects.

The school is provided with a collection of mechanical apparatus fitted to render the instruction in this science more intelligible and more easily apprehended.

Pupils.

The entries for the school year 1861–62, amounted to 153, and are divided among the different classes in the following manner:—

	Pupils.
Drawing	100
Modelling	9
Theory of stone-cutting	12
Preparatory class	13
First year of study in the professional school	11
Second do. do.	8
Total	153

Deducting from this number the duplicates arising from the same pupils being entered for several classes, the real number of these was 109.

The classification of the pupils according to age furnishes the following results:—

	Pupils.
Below 12 years of age	8
From 12 to 15	75
From 16 to 18	8
From 19 to 25	9
Above 25 years of age	9

The classification by trade gives:—

Under stonemasons	3
Stone-cutters	64
Carpenters	6
Other trades	7
Young pupils	29

The difference between the figures assigned to modelling and stone cutting, and the number of pupils in the second year of study, is, for the reason that persons too old or unable to attend profitably the various lessons, have been received in certain special classes, the most useful to their trades. Other pupils have been exempted from attending some of the classes. Thus those pupils carrying on trades such as carpenters, locksmiths, &c., for whom stone-cutting and modelling are of a minor utility, have been exempted from being present at those lessons, in order that they might attend more to drawing and architecture, and perfect themselves in a kind of knowledge more applicable to their trade.

The small number of persons who have attended the classes of the professional school strictly so called during the school year 1861–62, can be accounted for, on taking into consideration that, at that period the school had only been founded for two years; this time was not sufficient to allow the working class to appreciate all the advantages they could derive from attendance at this institution. However, the principal cause to which the small number of pupils must be attributed, is the want of instruction in the working class. In spite of the simple knowledge required on admission, which is reduced to reading and some idea of arithmetic, few workmen above 15 years of age can be found who possess these acquirements.

The inclination of the pupils to devote themselves almost exclusively to those subjects which have an immediate interest for them, cannot, however, conveniently be too much checked. Instead of being opposed, it is better in the actual state of things to try to render the school classes as attractive as possible for the greater number of the pupils. We have thought it necessary to tend towards this end, by restricting the course of instructoin in mechanics and physics, and putting off till the last year the study of those subjects. Modifications in accordance with this idea have been introduced into the programmes for the school year 1864–65. The stone cutting class has, at the same time, been divided into two sections; since then, the number of attendants has continually increased.

In fact, the entries for the school year 1865–66, have risen to 293, and are distributed as follows among the several classes:—

	Pupils.
Drawing	227
Modelling	11
Stone-cutting..	16
Preparatory class	23
First year of study in the professional school ..	13
Second " do. do. ..	3
Total	293

After deducting the double entries, this amount is reduced to 226 pupils.

The classification of the pupils according to trades furnishes the following results:—

Stone-cutters	134
Carpenters	12
Masons	3
Locksmiths	3
Mechanicians..	3
Clerks	4
Other trades	14
Without any trade	55

The classification of the pupils according to age is as follows:—

Below 12 years of age	26
From 12 to 15	113
From 16 to 18	65
From 19 to 25	21
Above 25 years of age	2

For what concerns the theoretical classes, the examinations on advancement and admission have given the following results:—

Of the 3 pupils of the first year's study admitted to the second year, 2 have attended this course with a fresh pupil.

8 pupils from the preparatory class, 3 new pupils and 2 old pupils, formed the class for the first year of study; 7 of these pupils have passed satisfactorily the examination on advancement to the second year of study.

The preparatory class was composed of 16 new pupils and 7 old pupils.

17 of these pupils have been admitted to the course of the first year of study.

The progress of the pupils is satisfactory, especially in the drawing and modelling classes. The competition in the year 1863–1864 shewed that the level of the instruction has been perceptibly raised in these two latter branches.

At the close of the school year 1861–1862, 3 pupils presented themselves for the prescribed examination, in order to obtain certificates of proficiency. Of this number 1 was turned back and 2 obtained their diplomas.

General Remarks.

In order to stimulate the zeal of the pupils, a competition has been established, at the close of which a distribution of prizes is made, consisting of medals, books, boxes of mathematical instruments, drawing books, &c. These rewards are given, every year, on the 15th August, at the same time that the prizes are distributed to the pupils of the middle-class school. This ceremony, at which many of the

public are always present, is accompanied by an exhibition of works executed by the pupils.

The school has a good influence upon the working class, and upon the industry of the town of Soigneis, and the neighbourhood. It provides this industry with efficient powers, and skilled workmen, who work the stone with taste, and execute the most complicated work, and above all, remarkable carvings, which the owners of the quarries could hardly undertake before, or which they were obliged to have executed elsewhere. On the other hand, it provides the pupils with knowledge which enables them to improve their condition considerably. It also acts favourably on their morality, giving them a taste for study, and ideas of order and providence which contribute to the spread of well-being and competency in families.

7th Section.—Industrial School of Tournay.

Foundation and Aim of the Institution.

The Industrial School of Tournay was at first instituted under the denomination of School of Arts and Trades (Ecole d'arts et metiers), by a resolution of the Communal Council, dated the 24th June, 1837, and had for its object the improvement of the principal branches of the local industry, to form good workmen, and efficient managers, and to inspire the young people admitted into the establishment with a feeling of duty, a love of work, and habits of order and economy.

The State, the province, the town, and the charitable institutions of Tournay each contributed 25,000 francs to the first expenses of the establishment. The *Bureau de Bienfaisance* also granted a subsidy of 10,000 francs. Lastly, legacies of 10,000, and 7,000 francs were bequeathed to the establishment by Mr. Lefebvre de Cambren, and the Baron L. Lefebvre.

The school, opened on the 1st April, 1841, was for boarders. Half of the pupils were admitted by nomination of the communal administration. In right of the subsidy allotted from the funds of the provinces, the permanent deputation of the provincial council had the power of placing in it young people natives of the province, but not of the town of Tournay. For its own part, as a condition attached to the subsidy of the State, the Government had reserved to itself the right of obtaining admission also, for a certain number of pupils belonging to the other provinces of the kingdom.

The school comprised workshops for hosiery, weaving, carpentering, iron and copper founding, braziers' work, locksmiths' work, and modelling, where the pupils practised according to their aptitude, and their natural disposition.

Independently of the trade instruction, the pupils were taught in classes held every day, morning and evening, reading, writing, grammar, arithmetic, bookkeeping, letter writing, the elements of history and geography; lessons of music, gymnastics, architecture, physics, and geometry, were given to them several times a week by special professors.

In June, 1860, the communal council organized the school on the new bases proposed by Government.

This reorganization had for effect:—1st. To transform the School of Arts and Trades into an Industrial School, properly so called, where all the apprentices, workmen, and artisans of the town and neighbourhood, possessing the requisite instruction, are admitted to obtain such knowledge as is useful in their trade, and to complete their primary education. 2nd. To reduce to two the number of workshops annexed

to the school: the workshop for construction, mechanical lock-making, and founding, and that for hosiery, and to suppress, consequently, the workshops for carpentering, weaving, and braziers' work, which did not seem to produce any adequate result. 3rd. To form of the boarding-school a distinct establishment, placed exclusively under the patronage of the communal administration, that is without any intervention from the State, or the province, as to what concerns the expenses and admittance of pupils.

These three institutions, each independent of the other, each having separate accounts, and nevertheless managed by the same committee.

Industrial School.

Subjects of Instruction and Educational Staff.

Although the organic regulations of the Industrial School do not include any preparatory class, it has been thought better to institute one for the benefit of the pupils of the boarding school, who are not sufficiently instructed to attend profitably the classes in the industrial school. This class is held morning and evening.

The subjects composing the instruction of the industrial school, properly so called, include three years of study, viz.:—

First year.—Arithmetic, geometry, linear drawing.

Second year.—Elementary mechanics, physics, graphic drawing upon paper.

Third year.—Applied mechanics, physics, chemistry, industrial drawing.

For the school year 1865–66, these courses have been modified in the following manner:—

1st. The subjects taught in the preparatory classes have been instructed in the first year of study; 2nd. To the first year's course, three hours of arithmetic lessons a-week instead of two, omitting a geometry lesson; 3rd. During the six last months of the year, lessons in the management and conducting of steam-engines have been added to the third year's course.

These changes were intended to render the instruction more elementary, and more practical.

The classes are held every day, from 6 to 8 o'clock in the evening in winter, and from 6 to 8 o'clock in the morning in summer.

The educational staff is composed of a director, a professor of mechanics, who also has the charge of the geometry classes, a professor of physics and chemistry, who also gives the arithmetic lessons, and a professor of linear and industrial drawing.

The apparatus designed for the scientific instruction is sufficient for our needs, since various acquisitions have been made for the classes of physics and chemistry. Large drawings for the principal parts of machinery serve to demonstrate the class of mechanics, which has also at its disposal the model of a steam-engine.

Pupils.

There were in the industrial school at the commencement of the school year 1861–62, 80 pupils, of whom 32 left before the close of the year. There were besides 15 pupils, who, not being sufficiently advanced to attend the scientific classes, were admitted to the class for linear drawing.

These numbers have scarcely varied in the following years.

During the school year 1865–66, the classes of the school were attended by 91 pupils distributed as follows:—

	Pupils.
Preparatory class	37
First year of study	32
Second „	16
Third „	6
Total	91

Workshops.

1. Subjects of Instruction.

According to the new organization, the workshops comprise hosiery, the construction of looms, mechanical construction, iron and copper founding, and moulding.

These workshops are opened, on all working days, from half-past 7 o'clock till noon, and from half-past 1 till 5 o'clock.

Hosiery.

2. Apparatus of the Workshops.

Nothing has been neglected in order to place the workshops for hosiery on a level with the progress realized in this branch of manufacture; looms with the latest improvements have been placed in it, especially a large circular loom, a rectilinear automatic loom, one on the system of Paget, of Loughborough, and several other English and French looms, &c. Thus the pupils, as well as the workmen and artisans, are able, by means of these looms, to keep themselves well-informed of the new processes of manufacture applied to this branch of industry.

A class designed to show the improvements introduced in the construction of stocking-looms is given in the workshops. Artisans are admitted to attend this class.

As there was not in the place any mechanician capable of making the necessary repairs to the looms, the least part that was defective had to be sent to Troyes in order to be set right. A mechanician, a Belgian by birth, who had worked for nearly twenty years in that city, was sent for to Tournay, and he has established at the school a workshop, furnished with improved implements, for the construction and repair of circular looms. This artificer has been sent to England in order to study the mechanism of the loom on Paget's system, which he purposes to construct at the school.

MECHANIC CONSTRUCTION, FOUNDRY, &c.

These workshops, established in 1841, have, since 1854, been greatly enlarged, under the skilful direction of the new manager. Steam-engines of the highest power, and the most complicated machinery, are made there.

In 1864, there were sent out of it—12 steam engines of different constructions, of the nominal power of 4, 6, 10, 16, 40, and 50 horse; locomotive engines, thrashing machines, moved by horse or steam power; different machines for agriculture, such as crushers, straw-cutters, root-cutters, sowing-machines, &c.; machines for breweries, distilleries, sugar-houses, steam-mills, ropeyards, manufactures of hydraulic cement, dye-houses, &c.

The manager of these workshops has obtained several honourable notices at the various industrial exhibitions where his works have been shown.

2. *Pupils.*

The number of pupils who have attended the workshops has been

respectively 57 during the school year 1861-62, 61 in 1862-63, and 74 in 1864-65.

There were 76 during the school year 1865-66 distributed as follows:—

	Pupils.
Mechanicians	32
Turners	8
Founders	7
Moulders	6
Makers of looms	4
Stocking weavers	13
Gardeners (employed in cultivation at the boarding school)	6
Total	76

General Remarks.

At the close of the last school year it was proved that the level of the students had been considerably raised. The number of pupils who attended the scientific classes has increased, and the greater part of them have given evidence of more solid attainments.

Every year, prizes, consisting of works treating of the sciences specially taught in the school, are distributed to the most deserving pupils. On the day of this solemnity the drawings executed by the pupils are exhibited in the hall where the distribution of prizes takes place.

The apprentices receive from the managers of the workshops, for hosiery and machinery a salary, which is increased according as their capacity is developed, and their work becomes more productive.

8th Section.—Industrial School of Liege.

Formation and Aim of the Institution.

This school, founded in 1825, under the patronage of the *Société d'Emulation*, and of the Society for the Encouragement of Elementary Education, kept the character of a private establishment till 1832, a period when the communial administration, recognizing the utility of the institution, admitted it among the number of communal establishments.

In 1860 the school was reorganized, with the co-operation of the Government.

It has for its object the propagation of the necessary acquirements for the carrying on of arts and trades, and particularly of those which are fitted to form sub-managers, overlookers, &c., for the manufactures of the place.

State of the Buildings.

The buildings are in good condition as to healthiness, but they are insufficient. Until the town shall have decided on their alteration, some work which has been thought necessary has been executed, to meet the most urgent requirements.

Subjects of Instruction and Educational Staff.

The instruction comprises elementary mathematics, and descriptive geometry as applied to industry, general and applied physics, general and applied chemistry, elementary mineralogy, construction, drawing, and particularly drawing applied to industry, and physiology.

There are besides preparatory classes, and a special class for working engineers.

The term of study is for three years.

The lessons are given, in winter, from a quarter past 7 to a quarter past 9 o'clock in the evening; in summer, from half-past 7 to half-past 9 in the evening.

The educational staff is composed of a director, professor of geometry and applied mechanics, of a professor of physics and chemistry, of a professor of lower mathematics, of two professors of the French language, of history, and of geography, of two professors of drawing and two teachers for the preparatory section.

The instruction in drawing is divided into two classes. In the one the pupil is occupied exclusively with drawing with the hand alone, without rule or compass, in order to form the eye and the hand of the pupil. It is not until he is able by the hand alone to make a tolerably exact sketch, that he passes to the geometrical drawing class, and practices the management of the drawing pen, the ruler, and the compass.

Each professor endeavours to adapt his teaching to the capacity of the workmen who, for the greater part, have only received an incomplete primary education. He strives to place under the eyes of the pupils the objects of which he is speaking, and to reproduce before them the phenomena that he is discussing. He is careful also to take, as the starting point of his explanations, and developments, a fact well known by his hearers, and from that to rise to the principles he wishes to inculcate. He satisfies himself, by frequent questions, that his pupils have understood him.

The school apparatus, which was very deficient, has been considerably augmented in 1863 and 1864, by means of a special subsidy of 12,950 francs granted by the town, the province, and the State.

Pupils.

The reopening of the classes, in accordance with the new regulations, having only taken place in the month of April, 1863, the following information only relates to a part of the school year 1862-63, and to the years 1863-64, 1864-65, 1865-66.

The pupils admitted in April 1863, were 153 in number, distributed as follows:—

	Pupils.
1st year of study	73
2nd „ „	53
3rd „ „	15
Free attendants	12
Total	153

The attendants are pupils authorized to be present at certain particular classes.

Fifty-nine new pupils presented themselves for examination on admission: 51 were admitted, two withdrawn, and six were rejected.

Ten new pupils presented themselves in succession after the close of the examinations; taking into consideration the period of transition in which we were, owing to the tardy re-opening of the classes, these pupils were admitted after having proved that they were sufficiently advanced to attend the classes with profit.

Twelve of the old pupils having been obliged, on account of their small advancement in their studies, to be classed in the first year of study, the total number of pupils for the school year was 73.

The age of the regular pupils varies from 18 to 19, 22, 23, and 24 years; the greater part are workmen employed in the factories.

In 1863–1864, the number of pupils entered was 1866:—

	Pupils.
First year of study	93
Second	69
Third	25
Total	186

This number was very much lessened during the six months of summer. It was reduced at the end of the school year, to 87 pupils, viz,:—

	Pupils.
First year of study	44
Second „ „	26
Third „ „	17
Total	87

For want of sufficient accommodation it was only possible to admit to the drawing classes 120 pupils, and 13 attendants. At the end of June, this number was reduced to 88, of which 77 were pupils, and 11 attendants.

The reduction has been of about 53 per cent. upon the whole of the classes, and of 34 per cent. in the drawing classes. This is a fact to be regretted, which, it seems does not occur at Liège alone. The causes of this diminution in the number of pupils, in the course of the school year, are of several kinds. For one thing, in the summer season, the masters keep their work people later at work. It is also the time when they employ them in works in places more or less distant. Also there are some workmen who leave the town to settle themselves elsewhere. Lastly, there are some, who, after irregular attendance, and having neglected to follow the course of the lessons, feel themselves no longer capable of keeping up with their more industrious fellow-pupils, and cease to attend the classes.

In order to obviate this inconvenience and that a greater number of pupils might profit by the instruction, it was decided that the seven first months should be occupied with general instruction, and that during the three summer months the least essential, or the more special parts, of the course should be given.

Fifty-seven new pupils underwent an examination for admission in October, 1863: 46 were admitted.

Sixteen pupils of the first year entered their names for examination on advancement; 11 were admitted to the second year of study.

Six pupils of the second year presented themselves to pass on to the third year: they were all admitted.

Five pupils asked to undergo the examination on leaving, one was turned back, four obtained certificates of proficiency. One of them intends following a profession connected with constructive arts, the three others are mechanicians.

The number of pupils who attended the school during the school year 1864–65, was 208. This is a considerable increase, which proves that the school is prospering. Another satisfactory indication is shown in the lessening number of the reduction which takes place every year, towards the month of June, in the members of the school.

Seventy-three pupils entered for examination on admission; 68 came up; 53 were admitted; 15 were rejected.

The examinations on advancement gave the following results: 26 pupils were admitted to pass to the second year's study; 19 pupils were thought sufficiently advanced to undertake the studies of the third year.

Six pupils passed the examination on leaving in order to obtain a diploma of proficiency; four with great credit, and two in a satisfactory manner.

Two hundred and sixty pupils attended the classes during the school year 1865–66.

As is evident the increase is considerable compared with the preceding years.

Seventy-two pupils entered their names for admission to the first year of study; 56 were admitted; 10 did not appear, or did not complete their examination; six were rejected.

Seven new pupils entered their names for admission to the second year of study; three were admitted, four rejected, but were judged admissable to the first year of study.

At the close of the school year, the body of professors decided upon the list of the pupils who should be admitted without examination, taking into consideration both their work during the year, their competition, and their assiduity, to pass to a higher year of study. This list contained 37 pupils of the first year judged capable of passing to the second, and 17 pupils of the second year, able to attend profitably the classes of the third year.

Two pupils presented themselves for examination on advancement from the first to the second year of study; they were both rejected.

No pupil presented himself for examination on advancement from the second to the third years of study.

Six pupils presented themselves for examination on leaving before the jury; two were turned back, four were admitted, and two with great credit, two with credit.

The examinations for obtaining a certificate of proficiency were higher this year than they have yet been, and the pupils admitted have given proof of serious and extensive attainments.

General Remarks.

The pupils give complete satisfaction as to what relates to discipline, behaviour, and morality. The director mentions the affection and respect which they have for the professors. The attention they give to the lessons, after a day's work, is a remarkable fact which proves how much they appreciate the instruction.

Only, during the summer six months, they attend the lessons less regularly.

The professional body, whose zeal deserves to be praised, often meet in order to discuss the measures to be taken in the interest of the institution, and to examine into questions arising from the organization of the school.

9th Section.—Industrial School of Huy.

§ *Foundation and Object of the Institution.*

The Industrial School of Huy was founded in 1838 by the Municipal College, who liberally supported it at the expense of the institution.

Being open in the evening to the adult workmen, of the town and

neighbouring communes, the school was soon attended by a great number of scholars.

Some years later the local administration, feeling that the school supplied a real want, established it on a firm basis by charging the communal treasury with the needful expenses.

Still later the provincial council, feeling that the institution was of provincial utility, granted an allowance of 750 francs, which was afterwards raised to 1,000 francs annually.

Lastly, in 1853 a subsidy of 1,000 francs, which has continued to be given annually, was granted from the funds of the State, to complete the organization of the school by founding a preparatory class in favour of those pupils whose education was too limited to enable them to follow the ordinary classes with profit.

Independently of this class, the school was divided into three sections, two lower and one upper.

The instruction comprised: linear drawing, specially as applied to arts and to mechanical and industrial works, arithmetic, French grammer, geometry, mechanics, physics and chemistry.

Things remained in this state until 1861, when the school was organized on a new basis, the concurrence of the State being assured to it on a more liberal and permanent footing. This reform had particularly in view the enlarging the course of industrial instruction and the increasing the number of advantages which the workmen might derive from it and to place it under Government control.

The communal council put forth in its sitting of the 24th July, 1861, a new code of regulations which were, on the 12th August following, approved by the Minister of the Interior.

§ II. *Condition of the Premises.*

The school is established in a building specially raised for it, adjoining that of the Communal College. It occupies five large rooms, one of them very large, for the drawing class, and two others for the cabinet of physical science, and the chemical laboratory.

§ III. *Subjects taught and Staff of Teachers.*

The length of study since its re-organization is three years for industrial instruction.

The school consists of five sections:

1st. The preparatory section.

2nd. The lower section.

3rd. The middle section.

4th. The upper section.

5th. The section specially for drawing.

In the Preparatory Section.—The elements of arithmetic, French, the geography of Belgium, and drawing.

Pupils are received in this section who have not acquired sufficient instruction at an elementary school.

In the Lower Section.—The repetition of the elements and higher branches of arithmetic, French, the first elements of geometry, and drawing.

In the Middle Section.—The first elements of algebra, geometry, the elements of mechanics, of physics, and chemistry, French, and drawing.

In the Upper Section.—Chemistry, mechanics, physics, French, the history of Belgium, and drawing.

In order to satisfy the desire of the Government to see *a school of design established in Huy*, in 1863 a greater development was given to the course of drawing in the industrial school, and it has been de-

termined to admit not only the pupils following the other courses given, but such young people as may wish to perfect themselves in the art of drawing, as well as children of ten years old, who attend the elementary schools.

The teaching in the *special drawing section*, comprises the following subjects :—

1st. Linear drawing so organized as to comprise the drawing of machines.

2nd. Principles of practical geometry, and the orders of architecture.

3rd. Study of ornament, from copies and from relief.

4th. Study of the head from drawing.

5th. Elementary perspective.

6th. Study of the head from the round.

The lessons are given on working days, from 7 to 9 in the evening, and on Sunday from 8 to 10 in the morning, conformably to the programme drawn up by the admistrative committee, and approved by the Minister of the Interior.

The staff of teachers is composed of a director, a professor of geometry and applied mechanics, a professor of physics and chemistry, a professor for the upper class on the French language, history, and geography, a professor for the lower class of lower mathematics, two professors of drawing, and two masters for the preparatory section.

The preparatory section is of great service to young workmen who on leaving the elementary schools, are not sufficiently advanced to be able to follow the courses of the industrial school with profit.

The teaching for the most part is essentially practical; too difficult or abstract theories are avoided with care.

In 1863, by command of the Department of the Interior, the communal council completed the collection of models and drawings, and the apparatus necessary for the teaching of science; a sum of 8,000 francs has been employed with that object.

§ IV.—*Pupils.*

The number of pupils who have been admitted to follow the courses has been successively—

	Pupils.
During the school year 1861-62 ..	101
„ „ „ 1862-63 ..	111
„ „ „ 1863-64 ..	159
„ „ „ 1864-65 ..	182

The attendance diminishes regularly towards the spring, and in the month of April there are seldom more than from 70 to 90 at the classes.

The pupils who followed the courses during the school year 1865-66 were thus divided :—

	Pupils.
In the preparatory section	52
In the lower section	54
In the middle section	18
In the upper section	4
In the special drawing section	87
Total ..	165

In the month of April, 1866, 97 pupils were still in attendance on the classes, and at the end of the school year this number was reduced to 84.

No pupil presented himself to obtain the certificate of proficiency.

The courses terminated at the end of the month of July, and the distribution of prizes took place at the latter end of the month of August.

§ *General Observations.*

In general, the progress of the pupils has been satisfactory, this progress will be greater when certain obstacles have been overcome which hinder the regular carrying on of the studies. The backwardness, and unequal instruction of the young people who present themselves to be admitted to the preparatory section, and the irregular attendance of the pupils, prevents the professors from giving their courses with the profit that would be desirable. The periods in which this irregularity of attendance is most marked are, the month of December, the second half of the month of March, and the summer months. These absences are put down carefully, and the pupil on his return, must justify them by a letter from his parents, or from the master of the workshop in which he is employed. It has been proved that they are rarely the pupil's fault, but arise from extra work imposed on the pupil by the master with whom he learns his trade.

These obstacles, which have been mentioned above, and which exist equally in other schools, will diminish and disappear in a great measure, when the utility of industrial education shall be more fully appreciated by parents and masters, and when they *better understand* the importance of regular attendance on the classes.

10th Section.—Industrial School at Seraing.

§ 1st.—*Foundation and Aim of Institution.*

On the initiative of some of the inhabitants of the commune of Seraing with the pecuniary assistance of several industrial societies situated in that locality, the communal council, at a meeting held on the 31st May, 1858, sanctioned the foundation of an industrial school.

In 1858 the Government made a grant of 1,000 francs to the establishment, but afterwards gave notice that the pecuniary help from the State could only be given on condition that the school should submit to the same regulations as other schools of the same description organized by Government intervention.

In obedience to this decree, the communal council by a resolution having date 18th December, 1860, made new rules which received Ministerial approval on 21st April, 1861, and were put into execution at the commencement of the school year 1861–62.

§ III.—*Subjects taught; Staff of Teachers.*

The industrial school comprises a preparatory section divided into two classes, in which are taught reading, writing, spelling, arithmetic, drawing and the elements of plane geometry.

In the industrial section the subjects taught are, arithmetic, algebra, geometry, trigonometry, physics, industrial drawing, chemistry and metallurgy, French, commercial science and bookkeeping, mechanics, construction, and practical physiology.

These subjects extended over three years' courses of study, but it was soon felt that too much was allotted to the first and second year, and since 1863 the courses have extended over four years.

The lessons take place on Monday, Tuesday, Wednesday, Thursday,

and Friday, from 7 to 8 o'clock P.M., in winter, and from 8 to 9 P.M., in summer.

The staff of teachers is composed of a director, a professor of mathematics, a professor of physics, a professor of chemistry and metallurgy, a professor of French and bookkeeping, a professor of physiology, and a professor of drawing.

In 1863, the school being without the instruments needed for scientific instruction, an extra subsidy of 2,500 francs was granted by the State for the purchase of the requisite instruments; the province added 500 francs from its own funds for the same object.

§ IV.—*Pupils.*

The number of pupils admitted to the school was as follows :—

	Preparatory section. Pupils.	Industrial section. Pupils.
1861-62..	89	64
1862-63..	69	66
1863-64..	72	64
1864-65..	70	64

During this period of four years, 11 pupils have passed their final examination with success, and obtained the certificate of proficiency required by the regulations. Examinations for admission and for promotion have also taken place regularly.

During the school year 1865-66, 66 pupils have passed through the course of instruction in the preparatory section, and 78 through that of the industrial section. That is to say :—

	Pupils.
1st year of instruction ..	45
2nd „ ..	10
3rd „ ..	17
4th „ ..	6
Total ..	78

The pupils attending the school are of the following trades :—

	Preparatory section. Pupils.	Industrial section. Pupils.
Clerks and designers	6	18
Carpenters	8	9
Draughtsmen	3	4
Machine-fitters	5	10
Machine-setters	2	5
Turners	4	3
Smiths	2	5
Moulders	6	1
Braziers	4	3
Machinists	2	0
Miners	2	0
Masons	3	0
Tinmen	0	2
Porters and cashiers	8	6
Day labourers	4	0
Without any calling	15	12
Total.. ..	66	78

Ninety-one pupils live in the commune of Seraing; the remainder come from the communes of Tilleur, Ougrée, Jemeppe, Flemalle Grand, Othée, Viller-le-Bouillot, Hadz, Tinlot, Rothena, Tavier, Ivoz, and Liège. Flemalle Haute, Chokier, Engis Grace Berleur, Zoon, Oreye, Thys,

Examinations for admission and promotion took place as in the preceding years, they have yielded the following results:—

26	pupils	have	been admitted to the	1st year.
8	"	"	"	2nd "
6	"	"	"	3rd "
3	"	"	"	4th "

Three pupils went up for the certificate of proficiency, two obtained that diploma, one with honour, and one with satisfactory mention.

§ V.—*General Observations.*

At the termination of each year's study, prizes are distributed to the best pupils of the different classes

Nothing can be better than the conduct and morality of the workmen.

The staff of teachers have fulfilled their duties with zeal and devotion.

The administrative committee, who equally merit praise, takes care to recommend each year to masters the pupils belonging to their establishments who have left the school with the diploma of proficiency. The greater part of these pupils are now occuping lucrative situations in various branches of industry.

Section X.—Professional School at Verviers.

§ 1*st.*—*Foundation and Aim of the Institution.*

In 1837 a school for artisans was founded under the patronage of the Chamber of Commerce of Vervier, and under the direction of the committee of the free communal schools, its object being to give to the working classes the iustruction required for their trades, and thus to make good workmen and skilful foremen in the different branches of industry carried on at Vervier.

From 1840 until 1862 the school received regularly every year a subsidy of 2,000 francs from the public funds, as well as an allowance of 500 francs from the communal funds.

In 1857 another institution, under the name of School of Industrial Design and Weaving, also founded by the Chamber of Commerce, in concert with the principal manufacturers of the town and neighbouring communes, was opened in order to teach weaving to apprentice pupils, to perfect the working weavers, and educate designers.

The chief aim of the founders was to initiate the workmen of Verviers into the principles of design, and into those combinations of weaving and colour which hold so important a place in the fabrication of stuffs for trousers and fancy articles, to bring into the workshops the study of, and taste for, design applied to industry, and to increase the technical knowledge of the weaver and foreman.

The management of the school was vested in a committee nominated by the Chamber of Commerce.

The ordinary expenses of the establishment amounted to 4,000 francs per annum. The State contributed a subsidy of 1,500 francs; the communal administrations of Vervier and Hodiment respectively 1,300 francs and 200 francs, while the remaining 1,000 francs were raised among the manufacturers connected with the institution; the

last-named had the right to send their own workmen to the school gratuitously and in preference to others.

From what has been said, it will be seen that the two institutions, although connected and equally placed under the patronage of the Chamber of Commerce, were managed by two different committees, and had each its separate funds.

In 1860 the Minister of the Interior, judging this a useless complication, and that for many reasons these establishments would be improved by being united, and together completing the instruction required by the special wants of the Verviers working class, begged the communal administration, together with the Chamber of Commerce, to effect this re-organization in concert with a functionary appointed by the Department of the Interior.

The Government specially desired that the institution should be essentially a communal institution, subject to the same rules as to superintendence, as to government, and accounts as those imposed on establishments of the same kind founded in other localities with the pecuniary help of the State.

After several conferences, the communal council decreed on the 18th July, 1862, that the two schools should be formed into one institution, and fixed the rules which should govern the establishment for the future.

This decision was agreed to by the Chamber of Commerce.

This new arrangement was approved by a ministerial decree of the 20th August, 1862, in virtue of a Royal decree of the 18th of the same month, and put in execution at the commencement of the school year 1862–63.

§ III. Subjects taught and staff of teachers. The instruction comprises:—

1st. Arithmetic and elementary geometry, specially with a view to its industrial application to the making of plans, to surveying, and levelling.

2nd. Linear drawing applied to engines and machines, to combinations (*assemblages*) in metals, wood, and stone, to the making of engines, industrial apparatus, and factories.

3rd. The elements of physics.

4th. The elements of industrial mechanics.

5th. The elements of chemistry, with regard to its application to local industry, and specially to dyeing.

6th. The various processes of weaving, and all connected with it.

7th. The theory of tissues, their classification, their manufacture, their composition, and their analysis.

8th. The theory of colours, their contrasts, and their combinations.

9th. Ornamental design, comprising the drawing of flowers from nature, the composition of groups of ornaments, of flowers, of trophies, &c., applied to damasks of all kinds, carpets, shawls, velvets, &c., together with the instruction needful for their application to the looms, arrangement of cases, &c. There is besides a preparatory course, teaching reading, writing, spelling, elementary arithmetic, the system of weights and measures, linear drawing, and the elements of industrial and commercial accounts; geometrical drawing is added to these branches of instruction, specially for mechanics.

These studies extend over three years, with an exception in favour of pupils admitted to the lessons in mechanics, chemistry, and weaving. The course of study is so arranged that at the expiration of the three years, the pupils may apply themselves to mechanical art, to woollen manufactures, or industrial design.

The instruction is divided into two sections.

First Section—Weaving.

First year.—Drawing, Mondays and Wednesdays, from 8 to 10 o'clock.

Weaving, Tuesdays and Thursdays, from 8 to 11 o'clock.

Second year.—Drawing, Tuesdays and Thursdays.

Weaving, Mondays, Wednesdays, and Fridays.

Second Section—Applied Sciences.

First year.—Outline drawing, Mondays and Wednesdays, from 8 to 10.

Designs and sketches of machines, Thursday, from 8 to 10 o'clock.

Mathematics, Wednesday, from 8 to 10 o'clock.

Geometry, Fridays, from 8 to 10 o'clock.

Second year.—Drawing, shading, colouring, sketches of machines, Tuesdays, from 8 to 10 o'clock.

Physics, and general chemistry, Thursdays, from 7 to 8 o'clock.

Manipulations and repetitions, Thursdays, from 8 to 10 o'clock.

Mechanics, Mondays and Wednesdays, from 7 to 10 o'clock.

The staff of instructors is composed of a director, a professor of physics and chemistry, a professor of geometry and practical mechanics, a professor of practical drawing, and a professor for the theory of weaving and the composition of fabrics.

In the preparatory section, the instruction is given by a master and two under masters.

By means of an extra subsidy, granted from the Government funds, for the expenses of the first establishment of the institution, the principal instruments and necessary apparatus for teaching science have been purchased. The employment of the entire sum has been deferred until such time as suitable premises shall be placed at the disposal of the school.

§ IV.—*Pupils.*

During the school year 1862–63, the first year following the reorganization of the school, there were 335 pupils on the books, 217 in their third year of study, 78 in the second year, and 40 in the first year. But, at the end of the term, these numbers were respectively reduced to 45, 52, and 13.

The greater part of the pupils who take lessons in weaving are admitted to them directly after undergoing an examination. Among the pupils learning geometry and mechanics are several who are in the weaving class.

These pupils may be classed under two categories :—

1st. The old school of workmen and artisans.

On the books, during the school year 1862–63, 88 pupils, of which 70 are for the first year, and 18 for the second. 30 of these pupils have regularly followed the geometrical course for the first year, and 11 that of mechanics.

The pupils joining during the year have applied themselves provisionally to drawing, the geometrical lessons being too difficult for them to be able to follow them with success.

2nd school of weaving :—

Since 1856, when the school was first opened, 470 pupils have been entered on the books.

During the school year 1862–63, 78 were entered on the books.

The number of scholars who have followed the course regularly was from 40 to 50.

During the school year 1863–64, the number of pupils in the preparatory school was 171.

The number of pupils who attended the courses of the industrial school was 164, distributed as follows :—

	Pupils.
First year.—Mathematics and drawing	39
Second year.—Section for physics, chemistry, and mechanics	38
Second year.—Section for weaving	33
Third year. „ „	21
Persons authorized to take lessons in chemistry ..	29
Pupils following during the day the paid course of weaving	4
Total	164

In 1864–65, the pupils entered on the books for the preparatory section were 175. The Industrial School numbered 102 pupils thus distributed in years of study.

	Pupils.
First year.—Mathematics and drawing	32
Second year.—Section for mechanics, physics, and chemistry	13
Second year.—Section for weaving	26
Third year—Section for physics and chemistry ..	12
Third year.—Section for weaving	14
Pupils following during the day the paid course of weaving	5
Total	102

Six diplomas as master weavers (maitre tisserand-monteur) were granted at the end of the school year.

The scholars during the school year 1865–66 were thus distributed :—

Preparatory section, 179 pupils; industrial section, 133, classified in the following manner, among the different classes :—

	Pupils.
First year.—Physics, chemistry, mathematics, and drawing, pupils admitted after examination	19
Pupils allowed to attend the classes	25
Weaving and drawing	18
Pupils allowed to attend the classes provisionally ..	28
Second year.—Physics and chemistry, mechanics, and drawing	6
Weaving and drawing	20
Pupils allowed to attend the classes	6
Physics and chemistry, as applied to colouring ..	8
Pupils entered for the paid course of weaving ..	3
Total	133

At the close of the school year six diplomas were granted, as master weavers.

§ V.—*General Observations.*

The application of the pupils is satisfactory. The books in which

they write out, from notes, the lessons on chemistry, and especially on physics, are very neatly kept. The advancement of their studies is principally hindered by irregular attendance consequent on being absent at work.

The course of studies is otherwise followed regularly, and the course laid down has been carried out with the exception of that for mechanics, which the professor has been obliged to reduce on account of the incapacity of the pupils.

The administrative committee hopes for good results from the grants of "travelling money," awarded to the first pupils of the two courses for weaving and applied chemistry.

A distribution of prizes takes place every year in the month of October. Mathematical instruments and books are given to the pupils who have distinguished themselves.

Pupils completing their last year declared the highest, having received more than three-quarters of the marks given, receive a gold medal. They are also entitled to the travelling money granted by the industrial society. In order to obtain this they must undergo an examination as to their knowledge of foreign industry.

The establishment is in a flourishing condition. In the opinion of the administrative commission it could be rendered more useful, were the premises large enough to set up a greater number of looms, and if a course of mechanics applied to the construction of machines and building were formed.

12th Section.—Industrial School of Hasselt.

§ 1st.—*Foundation and Aim of the Institution.*

The Industrial School of Hasselt, of which the rules were laid down by the communal council, on the 18th October, 1864, and approved by the Minister of the Interior, on the following 8th September, is annexed to the school of design with which it constitutes one establishment placed under the superintendence and direction of the administrative committee. This committee consists of the burgomaster of the town, the president, and six members, of which three are chosen by the communal council, and three by the Minister of the Interior.

The school was founded in order to complete the scientific and industrial education of young apprentices and workmen who had left the elementary schools.

§ III.—*Subjects taught, and Staff of Teachers.*

The instruction, extended over three years, comprises arithmetic, geometry, physics, mechanics, construction, and drawing.

The classes begin on the first Monday in October, and end on the last Saturday in April.

Lessons are given every day, except fête days, from 6 to 8 in the evening, and on Sundays from 10 to 12 in the morning.

The length of the lessons is one hour for arithmetic, geometry, physics, and mechanics, and two hours for drawing.

The staff of teachers consists of professors of drawing and architecture, who also have the superintendence of the other studies, a professor of arithmetic, a professor of geometry, a professor of physics and mechanics, and a professor of linear drawing.

The apparatus for teaching is tolerably good. As the funds may permit, the school collection will be made more complete.

§ IV.—*Pupils.*

The institution has been attended—

		Pupils.
During the school year	1862–63, by	67
„ „	„ 1863–64 „	114
„ „	„ 1864–65 „	127
„ „	„ 1865–66 „	136

These figures comprise all the pupils indiscriminately, even those who have been admitted in the middle of the term, and those who have left it before its close.

In the month of March, 1866, the different classes numbered:—

	Pupils.
In the course of architecture (1st year)	18
In the course of architecture (2nd year) ..	4
In the school of academic design, drawings from casts	1
In the school of academic design, drawings from engravings	5
In the course of arabesque drawing from casts (1st and 2nd divisions)	6
In the course of arabesque drawings from engravings (1st and 2nd division)	22
In the elementary course of linear drawing ..	50

Among these 106 pupils, 50 attended the arithmetic lessons, 38 went through the course of geometry, and 10 that of physics and mechanics.

§ V.—*General Observations.*

Rewards consisting of medals, books and instruments for architectural drawings have been given to the pupils distinguished by their application, their proficiency, and their good conduct.

The pupils have, for the most part, been industrious, and the teachers have rarely been obliged to have recourse to punishment.

13th Section.—Industrial School of Namur.

§ 1st.—*Foundation and Object of the Institution.*

The Industrial School of Namur was established by a resolution of the communal council, dated the 24th December, 1861. Being founded in order to give to the working class the knowledge necessary to the exercise of their arts and trades, it acted in the first instance as an exclusively communal establishment.

In 1862, in order to insure its existence, and to give it the greater development rendered necessary by the numerous demands for admission, the communal administration begged the pecuniary intervention of the State. This assistance was granted on condition that the school should be put under the rules always imposed upon similar institutions, founded or maintained in other localities by means of subsidies from the province and the State.

§ III.—*Subjects taught, and Staff of Teachers.*

The instruction comprises, French, the outlines of history and national geography, elementary mathematics in its application to industry, elementary geometry, the elements of descriptive geometry, of physics, of mechanics, of industrial chemistry, of mineralogy, architecture,

linear drawing, drawing applied to industry, constructions and physiology.

The teaching extends over three years.

The preparatory section of the industrial school, gives instruction in French, arithmetic, and the metrical system.

The staff of teachers comprises, a director, and professor of French, three professors for the scientific courses, a professor of architecture, drawing, and construction, a professor for the preparatory section, for the elements of the French language, and arithmetic, and a professor of history, geography, and physiology.

The school does not possess the necessary apparatus for teaching, the providing the school with the needful collection of models and instruments is deferred until the new premises shall be finished and appropriated. In the meantime, the physical collection and chemical laboratory of the college have been placed at the disposal of the school of industry.

§ IV. *Pupils.*

During the school year 1865-66, the school has been regularly attended by 80 pupils, divided as follows :—

	Pupils.
Preparatory course	40
First year	36
Second year	4
Third year	4
Total.. ..	80

§ V. *General Observations.*

The school of Namur is at present in a transition state; it is hoped that when it shall have taken possession of the premises preparing for it, it will rank among the successful institutions of like aim.

14th Section.—Industrial Museum.

§ 1st.—*Foundation and Object of the Institution.*

The industrial museum, founded by the late Government, in virtue of a Royal Decree, dated 16th September, 1826, has been since reorganized by a Royal Decree, dated 7th April, 1841. It contains: 1st, a depository of physical and chemical instruments, as well as models and machines for construction for arts and trades; 2ndly, a collection of plans of machinery; 3rdly, a technical library; 4thly, a collection of the principal publications treating of the application of the arts to industry.

Since 1846, a school of design has been annexed to this establishment, where the young people learn to draw, and to make plans for machinery.

Those who are desirous of admission to this branch of instruction must have previously acquired the indispensable preliminary knowledge, especially that of the elements of geometry.

The course extends over two years. During the first year the pupils are exercised in solving a certain number of geometrical problems, the practical solution of which is needed to this kind of drawing, and to draw apparatus and machines in detail on principles of descriptive geometry. The second year is devoted to drawing plans, and to copying machines in detail and entire.

The pupils are expected to attend the school of design every day

from ten until noon, except on Sundays and fête days. Each pupil must be provided with a case of mathematical instruments, and the other requisites for his studies.

As soon as the pupils are sufficiently advanced to produce designs, worthy of being preserved as a proof of their capacity, the museum furnishes them with paper for their drawings, which remain the property of the establishment.

Those pupils who, after having finished the two years' course, show that they possess the necessary knowledge to fit them to hold the situation of designers in an industrial establishment, receive a diploma recognizing their capacity.

The atelier of the designers is able to furnish plans for all the new machines.

The museum possesses a laboratory of chemistry where the analyses needful to industry are made.

The technical library is kept supplied with every publication relative to applied science, such as mechanics, physics, and chemistry.

The collection of industrial art is also furnished with all important additions relating to the matter, furniture, utensils, &c., whether ancient, or of the epochs or styles most esteemed in modern times. This collection has for its object to develop taste and to introduce elegance and style into industrial arts. It is open to the public.

§ *Public Lectures.*

In 1852 courses of public lectures on physics, chemistry, industrial mechanics political economy, and physiology have been instituted in connection with this museum.

These courses given in the winter from 7·30 to 9 o'clock, p.m., are attended by a great number of auditors belonging to all classes of society, although they had been specially instituted with a view to the scientific and intellectual development of workmen who had already received a certain amount of general instruction.

It is difficult to test the results of these lectures, they are doubtless useful, but for the labouring classes they can scarcely supply the place, of an actual industrial school, where the studies are in logical sequence, and lead the pupil step by step to the full knowledge of that which it is necessary for him to acquire in order to follow his calling with intelligence and skill.

Chapter III.—Superior Industrial Schools and Commercial Schools.

1st Section.—Industrial School of Mines of Hainault.

§ 1st.—*Foundation and Objects of the Institution.*

In virtue of a resolution of the provincial council, dated 13th July, 1837, this institution was founded bearing the name of the *Provincial School, of Commerce, of Industry, and of Mines of Hainault.*

The rules of the school, adopted on the 17th November, of the same year by the permanent deputation of the provincial council, were modified in some particulars by decrees of the same college dated the 8th March, and 5th October, 1839, and the 19th January, 1861.

On the 9th November, 1861, in order to obtain the intervention of Government in the administration of the school consequent on the subsidies granted on the funds of the State, the permanent

deputation of the provincial council drew up new rules, which were to take the place of the former ones and which received ministerial sanction on the 24th December following.

Afterwards, to make the regulations harmonize with the complete organisation introduced in later years into the establishment, the said college replaced them by a new general code of laws. These rules dated 6th January, 1865, received ministerial sanction on the 28th February following.

The object of this school is to give to young persons, not destined to university studies, the instruction needed by the requirements and progress of industry.

The instruction, superior to that given in other industrial schools, is not confined to the working of mines and metallurgy, but is also directed to the intelligent exercise of every other branch of industry. This school is to industry what the Commercial Institute of Antwerp is to commerce, a superior grade of industrial school.

§ 3rd. *Subjects taught, and Staff of Teachers.*

The subjects taught are: political economy, chemistry, and physics, geometry, and algebra, mechanics, metallurgy, geology, the working of mines, assaying, constructions, and industrial design.

The study of these subjects extends over a course of three years.

The pupils receive daily two lessons, each of two hours' duration, one in the morning and one in the afternoon.

The pupils draw every day for four hours.

The staff of teachers is composed of a professor director, of six professors, of two masters, and a superintendent of drawing.

The method of teaching is the same as in the universities.

The materials for the lessons are derived from numerous sources, and from the researches of the professors themselves.

The collection of minerals is large, comprising every specimen necessary to a highly developed course of study.

The collections, connected with physics, chemistry, and machanics, formerly very poor, were much increased in 1864 by means of a special grant; they are added to yearly from the ordinary funds.

§ 4th.—*Pupils.*

In order to be admitted pupils must:

1stly. Have completed their sixteenth year.

2ndly. Be acquainted with the French language, arithmetic in all its branches, the elements of geometry, equations to the 2nd degree, and the rudiments of linear drawing. Young persons not inhabiting the town of Mons, who can *undergo satisfactorily* an examination on all the subjects which are comprised in the course for the first year, may be admitted into the course for the second year of study.

The pupils pay annually, for one or for all the classes, a sum of 60 francs.

The permanent deputation have power to remit this payment in favour of pupils belonging to indigent families.

Persons nominated by the permanent deputation can, being free pupils, attend some or all the classes.

At the end of the third year of study the pupils who have successfully undergone a stringent examination, receive certificates of proficiency in the special kind of work which they have selected, on which their last labours have been expended, and in which they have chosen to enter the competitive lists.

The condition of the pupils during the 4 years of study was as follows:

For the school year 1861–62 out of 31 pupils applying, 9 were admitted for the 1st year's course of study, 16 were turned back, and 6 were refused. The examinations for promotion yield the following results. From the 1st to the 2nd year 14 were admitted, 1 was refused; from the 2nd to the 3rd year 2 were admitted, 6 were refused, 1 did not go up for examination. The number of pupils divided into the different three years' courses was 91; viz.: 1st year 33 pupils, of whom 1 was free; 2nd year 30 pupils, of whom 1 was free; 3rd year 28 pupils of whom 5 were free.

The final examinations take place before a jury named by the permanent deputation of the provincial council and presided over by a member of that college.

Of the 22 pupils entered, 16 have received the certificate of capacity; in the *section of the working of mines*, 3 with distinction, 4 very satisfactorily and 4 satisfactorily; in the *mechanical section*, 2 very satisfactorily, 2 satisfactorily; in the *metallurgic section* 1 very satisfactorily.

In the school year 1862–63 the examinations for admission have yielded the following results: of 26 pupils offering themselves, 3 being ill were made elegible for re-admission, 4 were admitted for the 1st year's course, 12 were turned back, 1 was refused, 6 withdrawen.

After the examinations for promotion from the 1st to the 2nd year's course, 7 were admitted, 4 were refused, 4 withdrew.

After the examinations for promotion from the 2nd to the 3rd year's course, 12 pupils were admitted, 2 were refused, and 2 withdrew.

The number of pupils entered was 75 thus distributed: 1st year, 33 pupils, of whom 6 were free; 2nd year, 18 pupils, of whom 1 was free; 3rd year, 24 pupils.

The number admitted is much fewer than the preceding year, owing in a great measure to the more stringent examinations, both for admission and promotion.

At the close of the school year 1862–63, twenty pupils went up for their final examination, in order to obtain certificates of proficiency.

In the *section for the working of mines* 10 pupils passed; 1 with great distinction, 3 with distinction, 2 very satisfactorily, and 4 satisfactorily.

In the *mechanical section*, 8 obtained the certificate of proficiency, 1 with the highest distinction, 3 with distinction, 2 very satisfactorily, and 2 satisfactorily.

In the *metallurgic section*, 2 pupils passed the examination satisfactorily.

In the school year 1863–64, 23 pupils, including old pupils, were admitted to the first year's course of study.

At the examination for promotion, of the 26 pupils entered for the first year, 1 quitted the school during the year, 1 was expelled, 5 retired before the examination, 2 did not pass, and 17 were admitted to the second year's course.

Of the 17 pupils entered for the second year, 4 retired before the examination, 1 was refused, and 12 were admitted to the third year's course.

The number of pupils entered at the commencement of the school year 1864–65 was 65; divided in the following manner, in the three years' courses of studies.

Ordinary pupils	1st year	23
„ „	2nd „	23
„ „	3rd „	13
Free pupils	.. ..	6
	Total ..	65

The number of pupils who presented themselves at the close of the school year 1863-64 for examinatton for certificates of proficiency was 23: 1 retired, 7 did not pass, 15 passed; among these was a candidate for the diploma of industrial chemistry, 6 for diplomas for mechanics, and 8 for the diploma for the working of mines.

In the school year 1865-66, 25 pupils were entered for the first year; 8 quitted the school during the year, 7 did not pass, 1 withdrew, 1 died, and 8 were admitted to the 2nd year.

Of the 23 pupils entered in the 2nd year, 1 quitted the school during the year, 4 did not pass, 1 withdrew, 17 were admitted to the 3rd year's course.

These examinations, joined to those of the candidates for scholarships, gave the following result for the year 1855-66:

Ordinary pupils	1st year	25
„ „	2nd „	11
„ „	3rd „	20
Free pupils ..	.. ..	11
	Total ..	67

The examination of the pupils of the 3rd year for diplomas, at the end of the school year 1864-65, took place at the beginning of June, 1865; of the 13 pupils entered, 4 did not pass, 8 passed, and 1 withdrew.

Five pupils, of the year 1863-64, competed successfully, making the number who passed 13; they were thus distributed:

Eight for the *section for the working of mines*, 4 for the *mechanical section*, 1 for the *metallurgic section*.

With the exception of two, whose written answers were not sufficiently satisfactory, these pupils underwent, on the 21st August, 1865, the public examination before the jury nominated by the permanent deputation, and presided over by one of its members.

Of the 11 pupils entered for examination, 3 have been turned back, and 8 obtained the certificate of proficiency; viz., in the *metallurgic section*, 1 very satisfactorily. In the section for the working of mines, 1 with great distinction, 2 with distinction, 2 very satisfactorily; in the *mechanical section*, 2 with distinction.

The pupils going out of the school with diplomas readily find employment in the working of mines, and in industrial establishments.

Section 2nd.—Upper Institution of Commerce.

§ 1.—*Foundation and Object of the Institution.*

The upper institution of commerce was founded with the concurrence of the Government, and of the communal administration of Antwerp, in virtue of a royal decree of the 29th October, 1852.

The organization of this establishment, as well as the regulations for its Government and internal order, were laid down by the managing committee on the 3rd October, 1853, sanctioned on the same day by the

communal council and the Minister of the Interior, and replaced by other decrees, in September, 1857, and April, 1860. The regulations relative to the examinations for promotion, and the final examinations, approved by the ministerial decree of the 25th July, 1861, were modified in some particulars by ministerial decrees of the 17th October, 1862, and the 6th October, 1863.

The object of the institution is to train good merchant and well informed commercial agents. It supplies a want which has been long felt in the plan of public instruction. In effect when each lower branch of instruction was completed by a corresponding branch of more advanced teaching, commercial studies, stopping short at the higher classes of the professional sections of the colleges and other ordinary educational establishments could only receive their necessary completion from practice.

The choice of the city of Antwerp as the seat of this establishment is justified by its exceptional position as the principal seaport and commercial metropolis of the country.

Subjects taught, and Staff of Teachers.

The instruction given in the institution is both theoretical and practical. It is completed in two years. There is a preparatory school more especially for foreigners who may not have the sufficient amount of knowledge to pass the examination for admittance.

The instruction in this school is given by superintending masters and by professors of languages. It comprises the following branches: French, German, English, history, geography, book keeping, arithmetic, algebra, geometry, physics and chemistry.

The subjects taught in the institution itself are as follows:—

Theoretical Division.—1stly. The general history of commerce and industry; 2ndly, commercial and industrial geography; 3rdly, political economy and statistics; 4thly, an exposition of the general principles of jurisprudence; 5thly, the comparison of commercial and maritime law, and the principles of the laws regulating the relations of commerce; 6thly, the custom laws of Belgium and other important countries; 7thly, the study of the construction and the fitting out of ships.

Practical Division.—Commercial and banking affairs and book-keeping. A commercial office has been established for the fictitious carrying on of these affairs; 2ndly, the study of natural productions, fabrics commercially considered; 3rdly, correspondence in German and English, as well as in Italian and Spanish.

The staff of teachers consists of a director, eight professors, three office clerks, and two superintending masters.

COURSE OF STUDY FOR THE FIRST YEAR.

I. *Commercial Office (lower section).*—The length of the lessons given by the head clerk and two under clerks of the office is four hours daily. The subjects taught are as follows: fictitious negotiations carried on by a commercial house, in all kinds of business (banking, merchandize, fitting out ships,) on its own account, on commission, for part profits, &c. The application of commercial calculations, and book-keeping, invoices, buying and selling accounts, accounts of expenses, current accounts, accounts for the return of merchandize, &c., operations in exchange, arbitration, public funds, the entering of each transaction in books regularly and practically kept on the principle of double entry, bills of exchange, contracts of association, bills of invoice, bills of lading, charter parties, engrossing letters, contracts of assurance,

accounts for recovering assurances and for special damages, the regulations concerning great damages, &c., usages peculiar to Antwerp and to the principal foreign places, comparison of weights, measures, &c.; correspondence in French, English, and German, on the subject of giving and receiving orders concerning the purchase and sale of merchandize, the consignment of ships and their cargoes; balance-sheet and settling of accounts at the end of the year.

The professors of the English and German languages have also the superintendence of the German and English correspondence.

II. *History of Commercial Products.*—This lesson is given on the specimens in the museum annexed to the institution; three hours a week are devoted to it; it comprises the examination and study of the produce of the mineral kingdom, of metallic and non-metallic substances, and of those belonging to the vegetable kingdom.

There is a laboratory, in which the pupils are initiated into the operations of commercial chemistry.

III. *Political Economy and Statistics.*—This class has three hours' lessons every week; every branch connected with the science is taught.

IV. *Commercial and Industrial Geography.*—Three hours' lesson every week. Subjects of study, the topography and statistics of the different countries of Europe, Asia, Africa, and America, Australia and Polynesia. These instructions, drawn from the latest Consular reports and the most recent communications, touch on the following points:—1stly, topographic situation, soil, mineral, vegetable and animal kingdoms; 2ndly, social and political state, institutions, their influence on the prosperity of the country, state of the public finances, national riches, prosperity, decay, their causes; 3rdly, principal productions of each country, the productions which can be procured with profit from them, tables of their exportations; 4thly, principal productions which each country requires to import, those with which Belgium especially furnishes them, those with which she could furnish them in addition, tables of their importations; 5thly, a sketch of the legislative economy and customs' duties of each country, obstacles and facilities met by commerce in them, tastes, habits of the population with relation to commerce; 6thly, detailed information concerning the principal places of commerce, their importance, their manner of conducting their affairs, &c., origin and determinate causes of the commercial relations between different countries.

V. *Law (an exposition of the general principles).*—This lesson occupies an hour every week.

VI. *German.*—Two hours' lesson a week.

VII. *English.*—Two hours' lesson a week.

VIII. *Spanish.*—Two hours' lesson a week.

IX. *Italian.*—Two hours' lesson a week.

Course for the Second Year.

I. *Commercial Office (higher section).*—The lessons last four hours daily.

The subjects forming the object of this course are: The completion of the study of the conditions of purchase and sale, and the general usages in commercial places in different parts of the world; formation of several sections established in different countries, and representing different commercial houses, fitting of ships, commission, assurance, banking, &c.; importations, exportations and transits, bookkeeping, accounts, creation, receiving and endorsing bills, operations of the exchange, giving and receiving instructions, the practical application

of matters learnt theoretically in the other classes, disputed questions, practical operations applying the knowledge acquired in the first course, accounts in each section; the commercial, financial and industrial relations to be observed with each trading country, correspondence in French, English, German, Spanish, and Italian commercial advices.

Besides daily information from the Exchange at Antwerp, the commercial office receives advices and journals regularly from London, from Liverpool, from New York, from Havanna, from Rio Janeiro, from Valparaiso, from Sydney, from India, from China, from Odessa, from Hamburg, from Amsterdam, from Havre, &c. All this information is communicated to the pupils whom it concerns in the original language.

The professors of foreign languages superintend the letters composed in different languages.

II. *History of the Products of Commerce.*—This course, comprising three hours' lesson in the week, relates to the following matters:—continuation of the examination and study of the produce of the vegetable kingdom, of the animal kingdom, and of manufactured fabrics.

III. *General History of Commerce and Industry.*—This course, comprising two hours' lesson a week, is divided into four periods, viz.: 1st, antiquity; 2nd, middle ages; 3rd, renaissance; 4th, modern times.

IV. *Commercial and Maritime Laws compared; Principles of the Law of Nations.*—Three hours a week are devoted to this course; it comprises a complete study of the commercial code, including the modifications it has received up to the present time, maritime law, and the law of nations in its relation to commerce.

V. *Custom Regulations.*—Two hour's lesson a week.

VI. *Ship Building and Fitting.*—One hour's lesson a week; this class is public and gratuitous.

VII. *Commercial and Industrial Geography.*—Three hours' lesson a week. The same subjects are taught as in the first year's course.

VIII. *Political Economy and Statistics.*—Three hours' lesson a week; same subjects as those comprised in the first year.

IX. *German (higher section).*—Two hours' lesson a week.

X. *English (higher siction).*—Two hours' lesson a week.

XI. *Italian (higher section).*—Two hours' lesson a week.

XII. *Spanish (higher section).*—Two hours' lesson a week.

The pupils follow only one of the last two courses, at their choice.

Since the commencement of the school year 1865-66, instead of four hours' lesson a week, the professors of modern languages give six hours.

The method of teaching is, for the actual classes, analagous to those of the universities. The professor lays down some axioms, and enlarges on them during his lesson, leaving the pupil to make notes of the lecture.

Towards the end of the term, repetitions and catechising are organized, with a view to preparing the pupils for examination.

In the language classes the teaching is more personal. This is also the case in the commercial office, which, properly speaking, is only a simulated counting-house for commercial transactions.

The professor of the history of the products of commerce supplements his course, by several experimental lectures beyond the hours fixed for the course of studies.

Repetitions of commercial arithmetic, given by one of the masters, complete the teaching of the commercial office.

All the courses of the institution begin between the 10th and 15th October, they are given in French. The affairs of the commercial office are carried on in the principal modern languages.

Practical lectures on the principal articles of commerce, merchandise, the operation of the Exchange, may be given to the pupils of the second year, either by brokers, merchants, or other practical persons. The pupils visit, in company with the director, the principal commercial and industrial establishments of the city and its environs.

The different lectures are given, morning and evening, before and after the office hours of the institution, and the private offices of the merchants of Antwerp, in order to make attendance on them easy to every one.

The materials for teaching comprise the necessary apparatus for chemical experiments, having for their object the testing the genuineness of goods.

A museum of specimens of natural and manufactured products, and a special library, are annexed to the institution. The Government furnishes the exotic productions through the medium of the Belgian Consuls; the indigenous productions are obtained either from the Government or from the manufacturers or merchants of the country. These collections, increasing from day to day, will ere long become a species of permanent exhibition of all which is industrially and commercially interesting to the country.

§ IV.—*Pupils.*

Each pupil must enter himself annually on the books of the institution; the entrance fee is 25 francs.

This payment is divided among the professors and masters, in proportion to the lessons given.

The pupil on the list is allowed to be entered for the course, this entry is general or special.

The general entry to all the classes for the first year cannot be obtained by the pupils until they have passed a preparatory examination, qualifying them with the title of scholars of the first year. The fee for this entry is 200 francs.

The general entrance to all the classes of the second year cannot be granted to pupils until they have passed an examination on all the the subjects connected with the first year's teaching entitling them to be called pupils of the second year. The fee is 250 francs.

Only half this sum is paid for each renewing of the general entrance.

Persons who do not desire to pass examinations may attend one or several of the classes on the payment of 40 francs, or in case of the renewal of attendance 20 francs.

The special entrance to the commercial office is 100 francs a-year. This entrance is only granted to pupils previously entered with special title to at least three classes of the first or second year of study, not comprising the language classes.

Special entrance is granted at any period of the year. No reduction of fee is made after the commencement of the courses.

No certificate is required for such entrance, except in the commercial office, when the candidate is submitted to an examination before the head clerk, on the elements of bookkeeping, French, the rudiments of German and English, and commercial arithmetic.

The pupils entered with a special title cannot obtain a diploma on leaving the institution.

The examinations are gratuitous, the examination of the pupils of the first year (examinations for admission) take place once every year, during the first week in October, before a commission appointed by the Minister of the Interior, and presided over by the director.

The subjects for examination are those taught in the professional sections of colleges, and in the preparatory school annexed to the institution; they are—

1st. A composition in French, and a translation from French or Flemish into English or German.

2nd. General geography.

3rd. The elements of universal history (ancient history, history of the middle ages, modern history). The Minister of the Interior fixes every year, in the month of January, what portion of universal history shall form the subject of examination for the October following.

4th. Arithmetic, and its application to commerce, the elements of algebra and geometry.

5th. The elements of bookkeeping.

6th. The rudiments of physics and chemistry.

This programme may be modified for foreigners, especially as regards languages.

The pupils who have passed their first examination in some college or academy in the kingdom are exempt from this examination, as are those who have received the certificate of primus in the German gymnasiums, or who can give proof that they have completed their preparatory studies, always supposing that they possess a tolerable knowledge of French, and two other languages.

The examination of the pupils of the second year takes place before the body of professors, united in a special commission, and presided over by the director, between the 5th and 10th August annually. The subjects for examination are named in the programme.

After the second year, juries, nominated by the Minister of the Interior, award to the pupils, having the requisite knowledge, diplomas of proficiency, and the recipient of this diploma, if a diploma of "great distinction," is eligible for the travelling-money granted.

The pupils entered numbered 79 for the school year 1861–62, 60 for that of 1862–63, 77 for that of 1863–64, and 70 for that of 1864–65.

During this period of four years 32 pupils have gone up for their final examination, and, to obtain diplomas of proficiency, 23 passed with success, 9 were turned back; among the pupils who succeeded 13 have passed satisfactorily, 6 with distinction, 2 with great distinction, and 2 with the highest distinction.

The number of pupils entered for the courses of the school year 1865–66 reached 65, distributed as follows:—

1st *Year.*

	Pupils.
Commercial office and correspondence ..	57
History and products of commerce ..	37
Political economy	45
Commercial geography	39
Law (rudiments)	35
German	46
English	53
Spanish	36
Italian	17

2nd *Year.*

	Pupils.
Commercial office and correspondonce ..	57
History of commercial products	14
History of commerce	17
Commercial and maritime law	14
Customs laws	12
Foreign languages (*see* 1st year)	
Ship-building and fitting	17

Of the 65 pupils entered 38 have been entered for the general course, after examination, or after furnishing proofs that they have completed their preparatory studies.

The others have followed the special courses as free pupils.

The examinations have yielded the following results:—

14 pupils have entered themselves for the examination for promotion; 3 withdrew, and 11 were admitted as pupils for the second year.

25 pupils have presented themselves for entrance; 12 were admitted with certificates, 11 after examination, 1 was turned back, and 1 withdrew.

In the month of August, 1866, 7 pupils underwent their final examination; 1 was turned back, and 6 obtained the diploma of proficiency, viz., 1 with distinction and honourable mention, and 5 satisfactorily.

§ *General Observations.*

The rules of the institution are properly carried out and discipline is carefully observed.

The pupils are required to attend the classes regularly, for which they have been entered, notes are made of the absent, and the parents have information given them.

The pupils may be submitted to the following punishments:—admonitions, suspension from the right of attending one or all the classes, and expulsion from the institution. In 1864, travelling-money was granted to three pupils in order that they might complete their commercial studies, in India, in Mexico, and in the East. Two others obtained grants to enable them to visit Mexico and North America. In 1865, three old pupils received travelling-money and the title of Consul-pupil to enable them to complete their education abroad.

Chapter IV.—Professional Teaching.—Workshops for Apprentices.

1st Section.—*Period from* 1840 *to* 1860.

Linen manufacture, from the culture of flax to the last manipulations of the fabrics, is an industry indigenous to the Flemish soil. Formerly it constituted, together with agricultural industry, with which it is intimately connected, almost the only branch of industry practised by the Flemish peasantry. In summer they were cultivators, in winter manufacturers.

The weaving industry has this advantage:—carried on in his own home, it can be perfectly combined with that of agriculture, the two industries supporting one another; the weaving agriculturist, after having profitably employed the dead season with the trade, is able to devote himself to agricultural labour at those periods of the year when

it requires the work of many hands and is remunerated with high wages.

In 1830, the linen manufacture employed no less than 220,611 spinners and 57,148 weavers.

This manufacture, in the first instance carried on by hand labour, suffered great disturbance in consequence of the introduction of spinning by machinery, and the progress made in the fabrication of cloths by other countries to whom Belgium had from time immemorial been accustomed to sell these fabrics.

It is well known, for instance, what rapid progress Ireland and other countries have made in the art of weaving, bleaching, and dressing linen, and with what frightful rapidity our own linen manufacture has decayed.

As early as 1830 the Flemish industry had lost ground; in 1834 this decline was so apparent that the Government and Legislature deemed it necessary to grant to the linen trade a protective tax, hitherto thought unnecessary, and imported goods had a duty levied on them; but this measure did not arrest the growing decay of the manufacture. The progress of the evil was so alarming, that a cry of distress arose from all parts of Flanders, calling on the Legislature to provide a remedy.

Unhappily, the Legislature was powerless to stop a crisis due to the improvements and economy brought to bear on the manufacture of cloths in neighbouring countries. The new industry which had sprung up, threatened the transformation, if not the entire ruin, of the old Flemish industry.

Several persons, however, struck by the misery threatening the large body of workmen in the linen manufacture, formed a society under the title of *National Association for the Encouragement of the Ancient Linen Trade.*

The object of this Society was to preserve to the country its superiority in the fabrication of linen, to serve as a rallying-point to the cultivators, spinners, and weavers, to spread useful hints as well as good methods of working, to excite and reward the spirit of improvement.

But these private efforts failed, owing to the greatness of the task.

The extended and deeply-rooted prejudice in favour of spinning by hand served as a great hindrance to the adoption of other methods.

In 1839, the Government felt itself called upon to give attention to the matter. It lent its support to the *National Association*, and acting on a request from the Society, the Minister of the Interior, on the 25th February, 1840, appointed a commission of enquiry, in order to examine into the condition of our linen manufacture in comparison to that of other countries, and to find out means for its amelioration.

The report of the commission, forming two large quarto volumes, was published in October, 1841. In its summary it suggested various methods for improving the linen trade; among others, the institution of industrial committees.

The provincial councils of West and East Flanders adopted this suggestion; and regulations, drawn up by permanent deputations, were sanctioned by royal decrees, dated 12th August and 13th October, 1843.

The objects of these committees were:—

1stly. To give to the most necessitous weavers battens with shuttles, in order to transform the old-fashioned looms into looms with flying shuttles.

2ndly. To give improved temples, steel combs, or, better still, to

establish in each commune a depôt for combs and treadles suited for different fabrics, and to lend them either gratuitously or on hire.

3rdly. To employ as teachers skilled weavers, capable of setting up looms, to visit in turn those weavers who have had battens with shuttles given to them, in order to teach the use of the flying shuttle and the fabrication of different kinds of cloths.

4thly. To establish, in certain central localities, workshops, specially to teach the use of looms with flying shuttles and the manufacture of different kinds of cloths.

5thly. To organize special workshops for the instruction of women and young girls in the weaving of light fabrics, a measure advised in several paragraphs of the report of the commission of enquiry into the manufacture of linen, to train good spinners in these workshops.

6thly. To introduce, as much as possible, a uniform system of numbering according to a fixed scale, for hand-wove fabrics.

7thly. To establish a school for weaving apprentices, and to make the communes, the bureau de bienfaisance, and provincial funds contribute, as far as possible, to their support.

In the next place, and as a temporary measure to prevent mendicity, the industrial committees were empowered to employ a portion of their funds to give employment to women, furnishing the materials for spinning to those who were utterly destitute; subsidies granted by the provinces and communes, and the produce of collections, were to be specially reserved for this use.

The permanent deputation of Hainault did not deem circumstances favourable for the organization of industrial committees in that province, and they deferred the execution of the project, not at the time considering it needed.

A royal decree, dated the 25th March, 1844, approved of the establishment at Ghent of a central committee of industry, whose office was to give the necessary advice and instruction in directing the labours of industrial committees, and in proposing the mode in which various grants *were to be employed in favour of the linen manufacture*, and the means of increasing the resources of the working class. A similar central committee was established at Bruges for West Flanders.

The financial resources of the industrial committees were derived from:—

1st. Grants from the *bureaux de bienfaisance.*

2nd. Grants from the communes.

3rd. Allowances from the funds of the province, or from the State.

4th. Private subscriptions.

The greater part of these committees limited their operations to spinning and weaving, which gave rise to an average loss of 26 per cent.

Considerable sums, especially in the disastrous years 1846 and 1847, were thus absorbed.

	Francs.	c.
The amount of the sums put at the disposal of the committees from the funds of the State, and converted into wages, rose to	406,154	33
The communes added	186,816	87
The *bureaux de bienfaisance*	68,790	68
Private subscriptions	91,278	64
Total sums	753,040	52

As benevolent institutions, the committees may have rendered service to the working population, but it is doubtful whether they have been beneficial as regards the industry.

Indeed, instead of ameliorating and giving new life to the manufacture, they have helped to depress it, by creating a ruinous competition to private industry by means of the public help which they distributed.

Their operations were the subject of numerous animadversions on the part of the Chamber of Commerce, which considered them obnoxious to free labour, and as having very little influence on the improvement of methods of manufacture.

The greater part of the committees allowed the spinning of flax without assorting the numbers, occasioning a vast quantity of thread to accumulate in the warehouse, which could only be sold at a very low price.

The bad employment of funds in the hands of a great many committees was also noticed in a report addressed to the Minister of Justice, by a committee formed to inquire into the means of bettering the condition of the working classes.

Independently of these industrial committees, the administration established as an experiment several workshops for apprentices, especially at Ghent, Roulers, and Ath. The success attending the establishment of these workshops, induced the Government to adhere especially to this mode of raising the industry of Flanders; and a royal decree, dated the 26th January, 1847, fixed the regulations which should govern the organization of these workshops. Besides which, as it was of importance to control the execution of measures of industrial order taken or to be taken in the workshops for apprentices, these establishments were put under the control of inspectors by a ministerial decree dated 13th March, 1849.

The object of these workshops, established in conformity with the organizeds regulations, was to bring the spinning and weaving of linen to perfection. But whatever might be the results of the improvements in the manufacture of linen, that industry could never hope to regain its ancient splendour, and consequently to furnish to the working classes of Flanders a sufficient supply of work. It was therefore necessary, in order to employ all hands, to try to replace a part of the linen by some other branches of manufacture.

With this aim there were established in several localities of Flanders workshops, designed to teach to the workmen the manufacture of different fabrics, particularly of different stuffs which were new to the provinces.

Since these allowances have been added to the budget of the Minister of the Interior to meet the effect of the crisis in the manufacture of linen, accounts have been several times given to the Legislative Chambers of the employment of the funds, and the measures taken for the benefit of that industry.

At the sitting of the Chamber of Representatives of the 24th of January, 1844, the Minister of the Interior gave an account of the employment and destination of the grants stated on the budget of 1843–44. This report, extracted from the "Moniteur," has been published in the form of a pamphlet.

At the beginning of 1845, and on the 13th May, 1846, detailed information was also published in the "Moniteur," and distributed in the form of a pamphlet (Moniteur, 6th March, 1845, and 13th May, 1846).

At the sitting of the Chamber of Representatives of the 28th

August, 1851, the reports of the Governors of Eastern and Western Flanders, and of Hainault, as to the condition of the workshops for apprentices established in those provinces, were laid on the table.

New reports, giving an account of the progress and extent of the services rendered by these institutions were presented to the Chamber of Representatives in the sittings of the 5th of May, 1854, and the 23rd January, 1858.

It is shown in the perusal of these documents, that the workshops for apprentices have contributed in a great measure to remedy the pauperism which overwhelmed Flanders at the time when the change in the method of spinning flax and manufacturing stuffs put a great number of workmen out of employment. The workshops have changed the old state of things by introducing new manufactures and improved methods by procuring new looms, and above all by changing the habits of the working class. They have also had the effect of raising the scale of wages, and exciting the spirit of enterprise.

The question arose, whether, these results obtained, it was not time that the intervention of Government should cease, and private industry should be left to use its own intelligence and activity to follow the track of this new progress.

In order to give a solution to this question, the Government instituted an inquiry in 1860, as to whether the workshops should disappear at the same time, as the cause which originated them, or, if in the interests of the populations and manufactures of Flanders, they should not continue to be maintained as permanent institutions.

The result of this inquiry was, that with a few rare exceptions, all competent authorities considered the workshops for apprentices as institutions needful for the professional education of the Flemish people, as well as for that of the industry they exercised, and that it would be advisable, after having introduced into their organization some modifications considered necessary, to maintain them as permanent establishments.

The results of this inquiry were communicated to the Chambers (*see* No. 6 of the Acts of the Chamber of Representatives, session 1860-61), who, recognizing the services rendered by the workshops for apprentices, and those which they might yet render, placed at the instigation of Government, among the ordinary items of the budget, the allowance appropriated to these institutions.

In consequence of this decision, fixing the permanent establishment of these workshops for apprentices, considered as institutions for professional teaching, it was determined, by royal decree, what should be the new rules which should govern the workshops for apprentices, having grants for their support from the State.

2nd Section.—Period from 1861-66.

The new regulations regarding the workshops for apprentices were formed in order to overcome the difficulties caused by the transition from the former state of affairs to the new condition of the industry consequent on the organic changes taking place in it.

Three points were stringently enforced in these regulations.

1stly. The workshops for apprentices having principally a communal interest, grants from the State and the provinces could only be given in co-operation with the communes. 2ndly. The mode in which these workshops should be organized. 3rdly. The third point on which the Government was specially stringent, was the elementary instruction of

the young persons attending the workshops, in order that the school training, forming their principles and developing their intellects, together with direct professional teaching, might put them in a position to earn their livelihood.

Desiring to learn the results obtained from the workshops for apprentices, under the government of these new regulations, the directors were ordered to make a report, specially on the internal arrangements of these establishments, their local situation, on the application of the provision with regard to moral and intellectual teaching, and on the means taken for the amelioration of their apparatus.

§ I.—*Government of the Workshops.*

When these workshops for apprentices were first established, they were organized in two different ways. In West Flanders, for the most part, the direction of these establishments was vested in special commissions, who, the greater part of the time, managed, at the expense of the State, the commercial part of the undertaking, or abstaining from all interference on that point, simply furnished the workpeople with premises and the means of instruction, leaving them to buy their own materials, and sell the produce. Afterwards, this arrangement was so far modified that the commission put themselves in connection with two or three manufacturers, who, without binding themselves by any contract, furnished the thread, and paid a price agreed upon for the weaving.

In East Flanders, on the contrary, recourse was had, most frequently to manufacturers who were placed at the head of the undertaking. The Government granted them subsidies, not interfering in any manner in the industrial management, but reserving to itself the right of strictly enforcing all regulations connected with customs' dues. These regulations were generally as follow:—

The manager was obliged to furnish a certain number of apprentices with regular work, and to pay them wages according to their ability, the *minimum* of which was always stipulated. The finished workmen, on leaving the establishment, mostly obtained work from the recommendation of the manager of the workshop, their places being immediately filled up by new apprentices.

The director of the workshop was bound to give up some of the skilled workmen to persons wishing to manufacture stuffs similar to those made in his establishment, and all the home manufacturers, furnished with a permission from competent authorities, were allowed to visit the workshops, to examine the working utensils and the work.

Certain agreements fixed the highest price of the productions of the workshops; others, the *minimum* price at which the goods might be exported.

The introduction of new industries is owing to this system, either in the country, or in the localities where it was wished to acclimatise them, such as the dying, weaving and dressing; articles from Roubaix, Tarare, St. Quentin, St. Gall, embroidered muslins and bazins, silk plush, ribbons, and foulards, imitation cashmeres, cotton velvets, woollen shawls, flannels, &c.

As regards the work done the workshops managed by manufacturers have been useful, but difficulties have arisen where the interests of workmen and master clashed.

The industrial condition of Flanders having completely changed,

and the workshops for apprentices being now fitted to serve as auxiliaries to professional teaching, the Government judged it expedient to abandon this system and to leave industry again in its former state of free competition.

When the organic decree of 10th February, 1861, was issued, there were, in West Flanders, only five workshops, managed in virtue of the conventions which would cease in the course of the years 1861–1862–1863. All these workshops have been turned into free workshops without causing any interruption to the work. The same has been the case in East Flanders.

The workshops established in the province of Hainault, at Templuve and at Pecq, were managed and worked by manufacturers. These workshops not being capable of transformation into free workshops, on the terms of the new organic decree, were closed; that of Templeuve on the 1st January, 1864, and that of Pecq on the 1st October following.

At this present time all the workshops under Government patronage, are placed under the direction of skilful foremen, and work is done for manufacturers who furnish the materials and pay the wages, that is to say that all manufacturers, without distinction, can have work done in the workshops. The preference is always given to those who offer the most advantageous terms to the workmen, both as regards their instruction and their wages.

This arrangement gives the directing committees the power of varying as much as possible the instruction of the pupils, who may prolong their stay in the workshops, until their apprenticeship is completed.

Under the system of contracts the pupils could do little more than exercise that branch of manufacture carried on by the manufacturer who managed the workshop. Under the present system they are initiated into weaving in all its branches, besides receiving moral and intellectual instruction.

The apprentices are not only taught to weave but also the preparation of chains, resetting and mounting looms, the analysation of patterns, reading off designs, in short all the operations which form part of the art of weaving.

Consequently, the workmen who, on leaving the workshop, work in their own homes, can, without the help of a foreman, apply their looms to all kinds of weaving, and analyse the designs of the stuffs given them to copy.

The foremen to whom the teaching is confided are chosen from the most skilful, indeed the progress of the apprentices depends as much on the choice of fit masters, as on the use of good weaving apparatus.

Before being admitted, they submit to an examination before a competent committee, and from time to time they meet together in order to examine and discuss the best methods of weaving, and the improvement of which they are susceptible.

§ II.—*Situation of the Premises.*

Among the conditions which the state and province exact before giving help to the workshops for apprentices, the first requisite is that the communes should provide convenient premises for the workshops. A ministerial circular dated 25th February, 1861, enforces this duty on the communes, declaring that it is only in exceptional cases and within very narrow limits that the assistance of the State and province will be given to this object.

§ III.—*Intellectual and Moral Teaching.*

In the report presented to the Chamber of Representatives in 1851, on the condition of the workshops for apprentices, attention has been called to, and the good effects shown of the combination of elementary with professional teaching. A law was passed on the 10th February, 1861, enforcing the application of this measure in every workshop. In order to insure the complete and regular execution of this plan, the Government has increased the sum, placed the budget of the Minister of the Interior to the account of the service of elementary education.

The application of this measure obtained complete success. It is stated that the pupils learnt in the two hours' instruction given in reading, writing, and the first elements of arithmetic, almost as rapidly as the pupils who remained all day at school.

Now, with scarcely an exception, work is combined with school teaching in every workshop. The pupils can instruct themselves while learning a trade, and when they have finished their apprenticeship, they know how to read, write, and calculate.

Several administrations have formed the project of organizing a library for the use of the weavers who have left the workshop. The realization of this project cannot fail to yield good results.

The workmen will thus be furnished with the means of completing their moral and intellectual education, and of enlarging the sphere of knowledge useful to their profession.

§ IV. *Amelioration of Apparatus.*

One of the ameliorations which the Government hopes to introduce into the workshops for apprentices is the employment of the best possible apparatus.

The amelioration and improvement of apparatus has the effect of diversifying the work, and thus enlarging the workman's sphere of capability.

By means of the sums put at the disposal of the provincial authorities by the Department of the Interior, a certain number of new looms have been obtained and different improvements, tested by practice, have been adopted. These ameliorations have for aim and result, not only to improve the quality and increase the value of the productions but also to extend the workman's facility of production. In these last respects, it may be said that his work has increased a sixth without any deterioration of its quality.

Formerly, linens as well as articles of cotton and wool, plain or with simple designs, were the almost exclusive branches of industry in the workshops not carried on by the manufacturers. Now, the multiplicity of different kinds of stuffs entrusted to the apprentices, constitutes the distinctive character of all the workshops and augments their usefulness as a means of professional training. Workmen who have completed their apprenticeship may be employed in every locality where weaving is carried on.

Chapter V.

1st Section.—Industrial Schools.

From the information contained in this Report, it will be seen that including the museum of industry, the school of industry, and of mines

of Hainault, and the superior institution of commerce, the industrial schools amount to sixteen in number.

The fourteen schools of industry, properly so called, are distributed as follows, among the different provinces of the kingdom: two in West Flanders, one in East Flanders, five in the province of Hainault, four in the province of Liège, one in the province of Limbourg, and one in the province of Namur.

The number of pupils in the ten schools,* the foundation of which was prior to 1863, amounted during the last three school years to 2,293 giving an average of 229 pupils to each institution.

The number of pupils leaving with certificates of proficiency, was during the same period and from the same schools 102. On an average rather more than 3 pupils obtained diplomas in each school annually.

The results might be more satisfactory, but it should be remarked that the greater part of the schools have been obliged to be reorganized, and that it is only for the last few years that they have been in regular operation Besides this, several of them are not yet provided with premises either suitable or large enough, nor with the necessary apparatus for practical experiments.

Of all these establishments, the Industrial School of Ghent is the most complete, and yields the most satisfactory results.

2nd Section.—Workshops for Apprentices.

There are at present 68 workshops for apprentices in Flanders; in 1860 they amounted to 83; 52 in West Flanders, and 31 in East Flanders; 1,528 looms are at work in the workshops which have been maintained, and 1,857 apprentices, and workmen there perfect themselves in the best methods of weaving.

The beneficial effects of these institutions can be appreciated by the number of workmen trained. In 1858, the date of the last report, there were 16,839; since then it has increased by 10,534, so that since the establishment of workshops 27,373 have been sent out perfectly skilled in the best methods of weaving. The workmen trained in the workshops now suppressed, are included in these numbers.

The number of workmen trained in certain workshops, might appear according to the time judged necessary for apprenticeship, to be little in accordance with the period for which the workshops have been established, and the number of the apprentices admitted. But it must be remarked that when these workshops were established in localities where plain cloths had been the only articles manufactured, it was necessary not only to initiate young people into the management of the loom, but to instruct weavers already proficient in the old methods, teaching them the use of improved implements, and especially of the flying shuttle. It may be easily understood that the industrial education of this last class of workmen would be much more rapidly accomplished than that of the apprentices, who generally enter the workshop without having acquired any previous notion of the art of weaving.

At the time of the crisis in the linen manufacture, the workmen, already skilled in hand-weaving, learnt in a month's time the perfect use of the flying shuttle. The number of weavers taught in these workshops has naturally been more considerable, than that of the workmen actually trained, and whose apprenticeship lasts ordinarily for a year.

* Bruges, Ghent, Soignees, Tournay, Liege, Huy, Seraing, Verviers, Hasselt, the school of industry, and mines of Hainault.

The wages of the apprentices varies from 35 centimes to a franc per day, that of the skilled workman rises, on an average to 1 fr. 75 c., and in certain localities to 2 fr. 50 c.

From the proceeds of 5 per cent. deducted from their wages, the workmen on finishing their apprenticeship are provided with implements, which enable them to exercise their trade at home.

In 1854, an attempt was made in the arrondissement of Courtray to employ women in weaving; there now exist several special workshops where young women are taught to weave light fabrics. Their wages are 1 fr. 25 c. per day, in favourable times they vary from 2fr. to 2 fr. 50 c.

The last international exhibition in London, has given an opportunity of showing the evident good effect which these workshops for apprentices has had on the working industry of Flanders. The productions of these workshops, which were exhibited have been highly approved. These productions have received honorable notice in the different classes where they have been distributed.

As regards morals the results have been no less satisfactory. It is remarked that the apprentices, who attend the workshops, have polite manners, are well behaved, and have habits of order and cleanliness, which form a contrast with those of children and adults whose work has not been subject to such discipline.

With some exceptions, caused by the financial condition of the communes, the expense of the workshops for apprentices, has been borne partly by the State, and partly by the commune and province.

The expenses arising from the purchase of looms, and improved apparatus are defrayed by the State and the province.

The following figures will show the amount of expenditure occasioned by the workshops in 1861-62-63-64-65 :—

1861.

Distribution of Expenses.	Contributed by the State.	Contributed by the Provinces.	Contributed by the Communes and the Bureaux de Bienfaisance.	Total.
	Fr.	Fr.	Fr.	Fr.
Workshops of West Flanders— Ordinary expenses	28,788·04	10,726·61	12,724·61	52,239·26
Workshops of East Flanders— Ordinary expenses	13,090·76	7,970·62	2,423·60	23,484·98
Workshops of Hainault— Ordinary expenses	538·75	271·25	1,762·00	2,572·00
Grants for apparatus of workshops	7,220·00	—	—	7,220·00
Travelling and other expenses of the Inspectors in Flanders ..	1,863·00	—	—	1,863·00
Total Fr.	51,500·55	18,968·48	16,910·21	87,379·24

1862.

Distribution of Expenses.	Contributed by the State.	Contributed by the Provinces.	Contributed by the Communes and the Bureaux de Bienfaisance.	Total.
	Fr.	Fr.	Fr.	Fr.
Workshops in West Flanders— Ordinary expenses	30,962·57	11,635·36	13,599·58	56,347·51
Workshops in East Flanders— Ordinary expenses	13,148·45	9,682·73	4,126·05	26,957·20
Workshops in Hainault— Ordinary expenses	538·76	271·25	1,762·00	2,572·00
Grants for apparatus in workshops	7,800·00	3,900·00	—	11,700·00
Travelling and other expenses of the Inspectors in Flanders ..	1,550·23	—	—	1,550·23
Total Fr.	54,000·00	25,539·34	19,587·63	99,126·94

1863.

Distribution of Expenses.	Contributed by the State.	Contributed by the Provinces.	Contributed by the Communes and the Bureaux de Bienfaisance.	Total.
	Fr.	Fr.	Fr.	Fr.
Workshops in West Flanders— Ordinary expenses	30,055·61	12,078·13	15,384·73	57,518·47
Workshops in East Flanders— Ordinary expenses	10,303·38	8,230·92	3,865·63	22,399·93
Workshops in Hainault— Ordinary expenses	4,038·75	271·25	1,762·00	6,072·00
Grants for apparatus in workshops	4,500·00	2,400·00	—	6,900·00
Travelling and other expenses of the Inspectors in Flanders ..	1,646·10	—	—	1,646·10
Total Fr.	50,543·84	22,980·30	21,012·36	94,536·50

1864.

Distribution of Expenses.	Contributed by the State.	Contributed by the Provinces.	Contributed by the Communes and the Bureaux de Bienfaisance.	Total.
	Fr.	Fr.	Fr.	Fr.
Workshops in West Flanders— Ordinary expenses	28,362·79	10,794·58	14,051·11	53,208·48
Workshops in East Flanders— Ordinary expenses	8,931·57	6,233·70	3,040·00	18,205·27
Grants for apparatus in workshops	6,000·00	4,800·00	—	10,800·00
Travelling and other expenses of the Inspectors in Flanders ..	2,718·55	—	—	2,718·55
Various expenses	3,811·85	—	—	3,811·85
Total Fr.	49,824·76	21,828·28	17,091·11	88,744·15

1865.

Distribution of Expenses.	Contributed by the State.	Contributed by the Provinces.	Contributed by the Communes and the Bureaux de Bienfaisance.	Total.
	Fr.	Fr.	Fr.	Fr.
Workshops in West Flanders— Ordinary expenses	36,598·07	15,718·16	17,435·03	69,751·26
Workshops in East Flanders — Ordinary expenses	9,463·50	4,509·04	3,517·50	17,490·04
Grants for apparatus in workshops	8,300·00	3,900·00	—	12,200·00
Travelling and other expenses of the Inspectors in Flanders ..	2,465·60	—	—	2,465·60
Total Fr.	56,827·17	24,127·20	20,952·53	101,906·90

To sum up, the results of the re-organization of the workshops for apprentices have been—1stly, the building of new premises; 2ndly, the changing into free workshops those formerly subject to contracts; 3rdly, the introduction of moral and intellectual teaching into the industrial establishments themselves; 4thly, the improvement of the apparatus for weaving; 5thly, above all it has had the effect of rendering the technical instruction of the workman more varied and complete by a longer stay in the workshop.

These ameliorations are mostly due to the active and enlightened concurrence of the administrative committees. Everywhere these colleges are obliged to maintain a good combination of intellectual with technical instruction.

The regular inspection and control to which these schools have been subject, have in no slight degree contributed to maintain and develop the active utility of these institutions.

The Minister of the Interior,

ALP. VAN DEN PEEREBOOM.

APPENDICES TO MR. FENTON'S REPORT (page 73).

Decree for the Reorganization of the System of Technical Education in Bavaria.

General Rules, definition as to the Object and Classification of the Technical Schools in general.

The technical educational establishments to which the School Regulations hereinafter mentioned, are to be applied, are public schools intended to prepare pupils for industrial, commercial, and agricultural pursuits, and for the higher technical professions; at the same time, however, they are preparatory establishments for certain special schools (Fachschulen), which are not included in the present school organization.

According, hereto, the technical educational institutions include the following categories:—

I. Industrial schools each provided, in accordance with local circumstances and requirements, with special subdivisions for instruction in commerce, agriculture, &c.

II. Technical gymnasium (*real gymnasium*).

III. Polytechnic schools with special divisions for,—

1. Architecture.
2. Mechanical engineering.
3. Technical chemistry.
4. Trade and commerce.

For instruction in the sciences connected with the management of forests, in veterinary science, and in the higher branches of agricultural science, special schools are already in existence.

First Section.—Industrial Schools.

Chapter I.—*Object and Extent of Instruction to be given in these Establishments in General.*

§ 1. The industrial schools are public educational establishments which impart suitable general culture, and special theoretical instruction for those who intend to follow industrial pursuits. They comprise as a general rule, three courses, and are in immediate connection with the popular schools.

All subjects taught in these schools are obligatory.

§ 2. When, in respect of any of the schools in this category, it is found desirable that the instruction should be extended so as to form special subdivisions for commercial, agricultural, and other studies, such extension, as well as the limitation of an industrial school to two courses, may be effected with the approval of the Minister of State.

Chapter II.—*Division of Instruction into Courses and Lessons.*

§ 3. The plan of the lessons in the industrial schools, is as follows:—

Course I.

Religion	weekly	2 hours
German language	„	5 „
Geography	„	2 „
History	„	2 „
Arithmetic	„	5 „
Natural History	„	4 „
Drawing	„	8 „
French language	„	2 „
Together		30 hours

Course II.

Religion	weekly	2 hours
German language	„	4 „
Geography	„	2 „
History	„	2 „
Algebra	„	2 „

Plane geometry	weekly	4 hours.
Natural philosophy (*Natur lehre*) ..	„	4 „
Drawing and embossing (*Bossiren*) ..	„	8 „
French language	„	2 „
Together ..		30 hours

COURSE III.

Religion	weekly	2 hours
German language	„	3 „
History	„	2 „
Algebra	„	3 „
Solid geometry and plane trigonometry	„	2 „
Descriptive geometry	„	2 „
Chemistry	„	4 „
Popular mechanics	„	4 „
Drawing and embossing	„	6 „
French language	„	2 „
Together ..		30 hours

§ 4. In the commercial division, the distribution of lessons is as follows :—

COURSE I.

a. In common with the pupils of the industrial school :

Religion	weekly	2 hours
German language	„	5 „
Geography	„	2 „
History	„	2 „
Arithmetic	„	5 „

b. For the commercial scholars separately :

French language	„	5 „
Calligraphy	„	5 „
In all ..		30 hours

COURSE II.

a. In common with the scholars of the industrial school :

Religion	weekly	2 hours
German language	„	4 „
Geography	„	2 „
History	„	2 „
Natural Philosophy	„	4 „

b. For the commercial scholars separately :

Commercial arithmetic	„	5 „
The science of commerce	„	6 „
French language	„	5 „
In all ..		30 hours

Course III.

a. In common with the scholars of the industrial school:

Religion	weekly	2 hours
German language	„	3 „
History	„	2 „
Chemistry	„	4 „

b. Separately:

Sience of commerce	„	6 „
Commercial geography and history of commerce	„	3 „
French language	„	5 „
English language	„	5 „
	In all ..	30 hours

§ 5. In the agricultural division the subjects of study shall be distributed as follows:—

Course I.

a. In common with the industrial scholars:

Religion	weekly	2 hours
German language	„	5 „
Geography	„	2 „
History	„	2 „
Arithmetic	„	5 „
Natural history	„	4 „

b. Separately:

Agricultural science	„	6 „
Drawing	„	4 „
Agricultural practice	„	—
	In all ..	60 hours

Course II.

a. In common with the industrial scolars:

Religion	weekly	2 hours
German language	„	4 „
Geography	„	2 „
History	„	2 „
Natural philosophy	„	4 „

Separately:

Agricultural science	weekly	6 hours
Arithmetical exercises	„	2 „
Drawing	„	2 „
Agricultural practice	„	—
	In all ..	24 hours

COURSE III.

a. In common with the industrial scholars:

Religion	weekly	2 hours
German language	„	3 „
History	„	2 „
Chemistry	„	4 „

b. Separately:

Agricultural science	„	8 „
Geometry	„	3 „
Drawing	„	2 „
Agricultural practice	„	—
	In all ..	24 hours

CHAPTER III.—*Extent of Instruction in each particular Subject—Programme of Studies.*

§ 6. The extent of the instruction to be given in each particular subject shall be regulated according to the subjoined programme.

Changes cannot be introduced without the sanction of the Royal Ministry of State.

COURSE I.

Religion.—According to the teaching of the established church.

German Language.—Exercises in reading in connection with exercises in orthography. The theory of the formation of words. The simple sentence with reference to the different parts and modes of speech. The theory of inflections (*Wortbiegungs lehre*). The fundamental principles of the composite sentence. Exercises in style, more particularly by verbal and written repetition, of narratives, short descriptions, &c. Composition of letters, making out accounts receipts, &c.

Geography.—The most necessary elements of mathematical geography. Cursory description of the surface of the earth. Topical geography of Europe. Special description of Bavaria and the other German States.

History.—Early and mediæval history of Bavaria until the beginning of the sixteenth century, with reference to the more important events of German history.

Arithmetic.—The first four rules. Explanation of the four rules with ordinary, and decimal fractions. Changing of decimal fractions into ordinary ones, and *vice versâ*. Changing ordinary fractions into serial fractions, and determination of approximative value of same. Geometrical proportions. Application of same to matters of business. Exercises in mental calculation, and in reductions.

Natural History.—Short survey of the anatomical structure of man, and of the most important differences of race, and the distribution of the various races throughout our globe. Suitable selections in the natural history of animals and plants in connection with demonstrations, but not treated in a strictly systematic manner. Description of the most common metals, earths, salts, and combustible minerals. Simultaneous instruction and exercise of the pupil in attentive observation

of natural objects, as also in the use of the exact terms descriptive of their qualities (Terminology). Knowledge of the treasures of nature, and of the character of the raw materials of industry derived from these, is to be the principal object of these lessons.

Drawing.—1. Semester: Exercise of eye and hand in drawing lines and geometrical figures. Delineation of objects of suitable size, and with plane surfaces. Explanations of the nature of vision, and with this the first elements of perspective. Linear drawing without instruments should be combined with free drawing (*Freihandzeichnung*).

2. Sesmester: Continuation of the free drawing. Delineation of simple ornaments from cartoons, or from plastic models in slight relief or perforated. Linear drawing with the aid of compasses and mathematical instruments.

Drawing, division, and measurement of straight lines, right angles, and figures, construction of scales, and measurement, &c.

French Language.—Rules of reading, and exercises in reading. Parts of speech as far as the irregular verbs. Verbal and written exercises.

Course II.

Religion.—According to the teachings of the church.

German Language.—Continuation of the exercises in reading, as also in free verbal repetition of what has been read.

The syntax of the simple and composite sentence comprising the theory of periods, with strict reference to the system of interpretation. Exercises in narrative and descriptive style, &c. Compositions relating to matters of business, more particularly business letters, agreements, notifications (*Anzeigen*), testimonials, trade inventions.

Geography.—Topical and political geography of all European States, with the exception of Germany, and with special reference to their natural and industrial productions, and their commerce. A cursory survey of the other parts of the globe, with special notice of the European colonies.

History.—Modern history of Bavaria in connection with German history.

Algebra.—The four fundamental operations in Algebra. Calculations with compound quantities and powers. Explanation of the rules of extracting the square and cubic roots of polynomials.

Application of these to the extraction of roots of numbers.

Equations of the first degree with one and two unknown quantities.

Exercises in the formation and solution of equations.

Plane Geometry.—Definitions of various geometrical magnitudes. Straight lines and their inclinations to each other. Triangles, their congruity and equality. Parallelograms, squares, regular polygons and the circle, as also the various angles and lines occurring therein. The transformation of figures and their division. Calculation of the superficial contents. and of the peripheries of various figures.

Exercises in Geometrical Figures.

Natural Philosophy.

Solid Bodies.—Gravity. The plumb line (*Senkel*). Absolute and specific gravity. The balance. The phenomena of the falling bodies in Attwood's machine.

Fluid Bodies.—Fundamental qualities of this form of aggregation.

Vertical and lateral pressure of fluids. The hydraulic press and its applications. The siphon. Floatation and the various hydrometers (*Senkwagen*).

Aeriform Bodies.—Fundamental phenomena of this form of aggregation. The barometer, Marcott's law. The air pump and its applications, the fire engine, blowing machines.

Heat.—Its generation, transmission, measurement, and application. The thermometer and calorimeter. Changes effected in bodies by heat. The hygrometer. Steam, its generation, its physics, mechanical qualities, and its application to industry.

Light.—Plane and spherical mirrors; the simple lens.

Electricity.—The phenomena of the electric machine. Lightning and the lightning rod.

The most important phenomena of galvanic electricity in the open and the closed battery.

The instruction in natural philosophy must throughout be accompanied by experiments.

Drawing and Embossing.—Free drawing of more elaborate ornaments from plastic models; the proportions of the human head, and its various parts from simple outlines.

Exercises in the construction of regular curved lines, architectural members, projection of simple surfaces, and of regular equilateral figures.

Embossing from simple plastic models in different sizes.

French Language.—Repetition of the regular verbs. The irregular verbs. Verbal and written exercises based upon what has been read.

Course III.

Religion.—According to the teachings of the church.

German Language.—Short survey of the most important rules of German composition. Themes on subjects taken from the circle of knowledge and experience already obtained by the pupil, and also themes on business matters. First principles of bookkeeping.

History.—German history with special reference, and closer attention to particular periods when discoveries in arts and industry have taken place, also geographical discoveries.

Algebra.—Powers and root. Explanation of the rules of calculation with these. Calculation with powers with fractional, positive, and negative exponent equations of the 2nd degree with one unknown quantity. Logarithms, and calculations with these. Arithmetical and geometrical proportions and progressions. Applications of the latter to calculations of compound interest, annuities, &c.

Solid Geometry and Plane Trigonometry.

Relation of points, straight lines, planes in space with reference to their mutual positions and inclinations—solid and plane angles. Prisms and pyramids and their division into sections by planes parallel with their bases. Regular polyhedrons. The three round bodies, the cylinder, the cone, and the sphere, and their sections by planes.

Calculation of the superficial and cubic contents of solids and their parts, and the determination of their reciprocal proportions.

Trignometrical or circle functions and their reciprocal relations.

Circle functions of angles which are the sums or differences of two others. Application of this rule to the relations of the sides and

angles of a triangle, so that out of three given parts the three other parts and the superficial contents can be found.

Descriptive Geometry.—Repetition of the first propositions (*Sceize*) of elementary solid geometry by way of introduction. Representation of points, straight lines and planes by means of their projection. Solution of the most important problems connected with these geometrical magnitudes. Determination of the inclination of straight lines and planes to the surface on which they are projected, and to each other. Determination of the section of planes and straight lines. Section of prisms, pyramids, cylinders and cones by planes. Statement of the true form and magnitude of the sections and development of the surfaces of these bodies. Determination of the position of a point or a straight line or a plane, which may be required to fulfil given conditions. Solution of triangular problems. Geometrical and isometrical projection of bodies. Planes tangential to cylindrical, conical and other surfaces of rotation. Use of these problems for the determination of shade lines and shadows upon planes by parallel rays of light.

Chemistry.—Atmospheric air. Decomposition (*zerlegung*) of this in a confined space by means of a burning substance. Combustion, perfect and imperfect, with and without flame; Argand's burners. Description (characterisation) of combustible materials. Combustion in free oxygen gas. Products of combustion. Acidification (*Saurebildung*). Oxydation. Reduction.

Water.—Decomposition of this in red-hot crucible.* Hydrogen. Ebullition. Steam boiling. Boiling in rarefied air. Evaporation. Distillation. Dry distillation of vegetable and animal bodies, and their most important products. Relation of water to solid bodies. Characterization of the most commonly known decomposable bodies. Dissolution. The vessels required for this, and the rules of proceeding.

Further fluids useful in dissolving, such as spirits of wine, ether, etheral oils, benzole, carburet of sulphur, &c., together with the substances with which they stand in relation. Separation of the dissolved substances from the solutions.

Acids (mineral and vegetable acids) which are used for etching, oxydising and dissolving, and in housekeeping.

Alkalis. Their relation to fatty substances (soap), and to the various earths (glass). Neutralisation Generation of salts, and characterization of the salts in most general use in households and in industry,

Metals (only such as are used in various trades and industries). Smelting. Oxydation. Reduction. Decomposition. Precipitation. Alloyage.

Spirituous fermentation, acidification, putrification, conservation.

All the chemical processes named above must be exemplified by experiment, and care must be taken, in each case, to point out the rules on which the success of the experiments depend.

Popular Mechanics.—The method of teaching should be chiefly by means of drawing.

Rest and motion; motive power, reaction; quantity, direction, and centre of activity of force; equilibrium; composition and resolution of forces; gravity (examples of determinations of weights; centre of gravity. Equilibrium of the lever and its modifications; point of inertia; combinations of levers. Scales, steel-yard, iron crow, crane, wheel works, &c., &c. Stability; equilibrium on the inclined plane and its modifications; combinations of the same (the wedge, screw-press, screw machinery, and pulley). Attachments (simple examples to explain these; ropes, chains, poles, walls, pillars, beams). Friction

(mural resistance and transport of heavy weights). Uniform motion (examples of determination of velocity). Uniform, accelerated, and retarded motion. The fall of bodies. The pendulum. Compound motion. Line of projection. Transmission of uniform revolving motion through means of wheelworks (rules for velocity and revolving numbers, with reference to clocks, transmissions, &c.). Action and effects of the motive powers and resistances. Natural powers (examples—water-courses, fly-wheels). Flow of liquids from vessels. (Hydromtry): pumps, water-wheels, and turbines. Nature of steam; pressure of steam; steam-engines; determination of the absolute effect of power-engines, explanation of the utility of these.

Drawing and Embossing.—Continuation of exercises in free drawing, from the round; delineation of animals and plants, in as far as these may be applicable to ornamentation, with slight indication of shades, so as to make the form distinct; explanation of style; delineation of the human body, and its proportions, in outline.

Linear drawing; continuation of exercises in designing simple machines and models; the five orders of architecture; industrial tools; profiles, &c., as far as possible in natural size, from models; sketching from nature; exercises in drawing with Indian ink; slight colouring of profiles, &c.

Embossing from drawings of simple classical artistic forms.

French Language.—Continuation of grammar; reading of select extracts; exercises in dictation and conversation.

§ 7. The special instruction for commercial pupils shall comprise:—

In Course I.

In the French Language.—Etymology, including the irregular verbs, with continued exercises in translating into French.

Calligraphy.—Exercises in a current German and English handwriting, by making out invoices, bills of exchange, writing commercial letters, &c.

In Course II.

Commercial Arithmetic.—Calculation of profits by multiplication and division. Compound rule of three. Simple and complex partnership accounts. Compound calculations and calculation of percentage. Calculation of interest, and discount. Lessons in the knowledge of coins, measures, and weights. Bankers' accounts. Direct and indirect reduction of bills of exchange. Bills of lading and invoices.

Mercantile Science.—The most essential parts of the theory of banking, with explanation of the most common terms used in banking. Making out of various forms of bills of exchange. Invoices and calculations. Simple book-keeping. Elaboration of a course of business, making the necessary entries connected with it in the proper books, and then making up the latter. Composition of the most important letters for simple bookkeeping. Opening and closing of accounts current according to various rates of interest.

French Language.—Continued exercises in the irregular verbs. Grammar according to the regular gradations. Reading of suitable extracts, with continued exercise in written translations from German into French. Conversation.

In Course III.

Mercantile Science.—Arbitration. Banking commissions. Publi-

stocks. Customs and trade regulations. Commercial associations and mercantile systems. Bookkeeping by double-entry; composition of most important letters for this.

Commercial Geography and Commercial History.—The various States of Europe, with reference to their commercial productions, the principal seats of their commerce and industry, their lines of traffic, their customs, laws, &c.

The Nature of Colonies.—Synoptic history of commerce during the middle ages, more particularly of German commerce. Influence of geographical discoveries, and especially of the discovery of America, and of the ocean road to India, on the intercourse of nations. Commercial history of the European maritime powers in modern times.

French Language.—Continuation of grammar. Reading select extracts. Composition of mercantile letters. Exercises in conversation.

English Language.—Elements of the grammar and practice of the rules, by means of verbal and written translations. Exercises in reading and speaking.

§ 8. The special instruction given in the agricultural class, comprises:—

In Course I.

Science of Agriculture.—Knowledge of the various soils: Productive power and value of the different soils. Improvement of soil. Mould (*? Ackerkrumme*) and subsoil. Influence of local situation and climate on the quality of the soil. Working of the soil. The most important agricultural implements.

Drawing.—I. Semester:—Exercises of the eye and hand in drawing lines, geometrical figures, and simple ornamental forms, from large cartoons. Drawing of objects of suitable size with plane surfaces. Explanation of the nature of vision and elements of perspective.

II. Semester:—Linear drawing, with help of compasses and mathematical instruments, drawing, dividing, and measuring straight lines, plane angles and figures, and construction of scales of measurement. Exercises in drawing plans and elevations of simple geometrical bodies, in various positions, and in rules of the theory of projections.

In Course II.

Agricultural Science.—*a.* The knowledge of manures. Effects and value of manures. Animal, vegetable, and mineral manures. Compost. Liquid manure (*? Jauche*). Constitution of manure heaps. Treatment of manure in the stable, in the field, and in the manure heap.

b. General culture of plants. Plants useful in agriculture. Sowing and cultivation of plants. Harvesting and storing of fruits.

c. Special cultivation of plants. The various species of corn, pulse, roots, and tuberous plants, and plants used in commerce and manufactures. Meadow cultivation. Draining and irrigation. The elements of tree-fruit culture.

Arithmetical Exercises.—Application of arithmetic to the various calculations occurring in connexion with farming.

Drawing.—Exercises in drawing, plans and elevations of separate architectural parts, more especially of the stationary arrangements of farm buildings, from models and also from nature. Delineation of simple agricultural implements. First rules of plan-drawing (*Situations und Cultur plänen*).

In Course III.

a. General and special cattle breeding, with particular reference to the circumstances and requirements of Bavaria. The most usual diseases among domestic animals.

b. Farming business. The system of fallows (*Feldsysteme*). Agricultural bookkeeping. Elementary instruction in keeping business accounts and making valuations of property.

Geometry.—The Point. Straight lines. Angles and parallels. Triangle and square. Congruity and similarity. Square measurements. Division and transformation of numbers. Use of the measuring chain and staff. Prismatic and cylindrical bodies.

Drawing.—Exercises in drawing entire buildings from models on a different scale of measurement. Delineation of ground-plans, elevations, and sections. Delineation of more complete agricultural tools and machines without models.

§ 9 relates to the books to be used in the schools.

§ 10 prescribes the method of teaching, by demonstrations, questions and answers. Regular lectures are prohibited, and the teachers are enjoined to give much attention to correctness of expression in the pupils, and to a good and distinct handwriting.

Chapter IV.

Relates to the division of the school year, the admission, and dismission of the scholars, and their advancement in the schools. The ages of admission are from 12 to 14. Possession of a certain amount of preliminary knowledge is necessary. The annual school fee is at least five florins, except in cases of properly attested poverty. Trade apprentices may be admitted to attend particular lessons, on payment, for one subject, of half the school fee, and for two or more subjects, of the whole of the school fee. Other scholars must attend all the lessons. Pupils are expected to do lessons at home, which must subsequently be carefully corrected by the teachers.

A system of marks, and examinations, and annual distribution of prizes, prevails.

Chapter V.

Lays down the rules for the maintenance of discipline in the schools, and regulates the functions of the school authorities, and the nature of the reports to be made at the close of every school year.

Chapter VI.

Higher Industrial School (*Gewerbliche Fortbildungs Schulen*).

§ 28. The object of the Higher Industrial Schools is, on the one hand, to meet the requirements of such apprentices and artizans who are not able to attend an industrial school, and on the other hand, to afford opportunities for the pupils of the industrial schools, after they have entered a trade, to keep up and extend their knowledge.

The higher industrial schools are either supplementary to the Industrial Schools, or as a development of the popular schools, independent institutions.

§ 29. The school consists of an elementary division, and several special divisions.

The elementary class is intended to fix in the memory, and to expand, the knowledge obtained in the popular school, and to afford opportunities for practice in drawing. The arrangements of each special class should, as much as possible, be guided by the requirements of the district in which the school is situated.

§ 30. Instruction in these schools is to be given on Sundays and holidays, and, as a general rule, two evenings in the week besides.

Pupils who attend the elementary class are bound to take part in all the lessons given.

In the special divisions or classes, each pupil may select his subjects.

§ 31. In the elementary class instruction shall be given in—

1. Religion.
2. German language, exercises in composition, and written tasks relating to matters of business.
3. Arithmetic.
4. Drawing.

In the special classes :—

1. Drawing in various branches.
2. Embossing and modelling.
3. Arithmetic, and its application to industrial pursuits.
4. Geometry.
5. Natural philosophy.
6. Chemistry.
7. Properties of materials used in industry.
8. Bookkeeping relating to industrial enterprises.
9. Practical exercises in some special trade.

§ 32. In the elementary division, as in the special classes, the instruction ought always to be given with particular reference to the future calling of the pupils.

In order to render the instruction in all its branches as effective as possible, the teachers, and more particularly those presiding over the special classes, should keep up a lively intercourse with the various trades, and extend this by visits to various workshops and factories to the business carried on in which the lessons may relate.

2nd Section.

The Technical Gymnasium (*Real Gymnasium.*)

Chapter I.

Object of the Institution and general scope of the Instruction given.

§ 33. The technical gymnasium is a public educational institution consisting of four courses, which supposes the pupils to be in previous possession of a knowledge of all the subjects taught in a first class classical school, which runs parallel with the classical gymnasium, and the aim of which is to afford opportunities for the attainment of higher and general scientific culture, and to form a suitable preparation for such callings as require special acquaintance with the exact sciences.

The absolutorium (final examination and certificate) of the technical gymnasium, entitles to admission into the Polytechnic School, as also into the University, for participation in such studies as do not fall within the special limits of the three faculties of theology, jurisprudence, and medicine.

Whether, and under what conditions, pupils leaving the technical gymnasium shall be entitled to admission into the school for teaching the management of forests, or the Central Agricultural School, or the Central School of Veterinary Science, or to the preliminary practice for separate branches of the service of the State, is reserved for special decision.

All the subjects taught in the technical gymnasium are obligatory.

Chapter II.

Division of the studies into courses and lessons.

§ 34. The plan of the lessons in the Technical Institution is as follows:—

Course I.

Religion	weekly	2	hours.
Algebra	„	4	„
Plane geometry	„	3	„
German language	„	4	„
Latin	„	4	„
French	„	4	„
Geography	„	3	„
Drawing	„	6	„
In all		30	hours

Course II.

Religion	weekly	2	hours
Algebra	„	3	„
Plane geometry	„	2	„
Natural history (zoology and botany)	„	4	„
German	„	3	„
Latin	„	4	„
French	„	4	„
Geography	„	2	„
Drawing	„	6	„
In all		30	hours

Course III.

Religion	weekly	2	hours
Solid geometry	„	2	„
Algebra and trigonometry	„	4	„
Physics	„	5	„
Descriptive geometry	„	2	„
German	„	2	„
Latin	„	3	„
French	„	3	„
History	„	2	„
Drawing and embossing	„	6	„
In all		31	hours

COURSE IV.

Religion	weekly	2 hours
The elements of higher analysis	„	2 „
Analytical geometry	„	2 „
Descriptive geometry	„	3 „
Mineralogy and chemistry	„	5 „
Latin	„	3 „
French	„	2 „
English	„	4 „
History	„	2 „
Drawing and modelling	„	6 „
	In all	31 hours.

CHAPTER III.

Extent of Instruction to be given in each subject.

§ 35. The extent of instruction to be given is determined in the subjoined programme.

Alterations can only be introduced with the approval of the Ministry.

COURSE I.

Religion.—According to the doctrines of the church.

Algebra.—Short repetition of the fundamental algebra operations; application of the rules in various examples; reduction of algebraic expressions.

Powers.—Calculation with powers which have positive and negative exponents. Construction of the second and third power of a polynomial.

Root-quantities.—Calculations with root-quantities. Powers with fractional exponents. Application of the products obtained, to the extraction of square and cube roots from quantities and numbers.

Equations of the *first* degree with one or more unknown quantities. Equations of the *second* degree with one or two unknown quantities. Exercises in setting or solving equations according to the different methods.

Plane Geometry.—Straight lines, and their inclination towards each other. Parallels.—The congruity of the triangle. Definition of triangles, squares, and polygons. Relation of their sides and angles.

The circle and the relations of the lines, angles, and figures occurring therein. Application of these theorems to the solution of different problems by construction.

German Language.—The theory of the formation of words, with repetition of the most important rules of orthography. Detailed treatment of the syntax, of the simple and the composite sentence, including the theory of periods with constant reference to the rules of punctuation.

Continued exercises in punctuation, as also in the inflection of words, in the correct use of verbs, adjectives, and prepositions. In reading and explaining selections in verse and prose; statement of contents; committing pieces to memory, with a view to fluent speaking. Exercises in composition of narratives, descriptions, and letters.

Reading book to be selected by Ministerial Department.

Latin Language.—Reading "Cæsar de Bello Gallico," or a Chresto-

malthy containing long extracts from the easier Latin writers, and extracts from Ovid's elegies and metamorphoses.

French Language.—Reading of single words and simple sentences, with explanation of the more important rules of pronunciation.

Committing to memory the words and sentences thus explained. The theory of the formation of words and etymology, inclusive of the irregular verbs. Verbal and written exercises in translating simple sentences from German into French.

Geography.—The most important parts of mathematical geography. Cursory survey of the surface of the earth according to its natural divisions and physical conditions. Topical, physical, and political description of the various European States.

Drawing.—Free drawing. Exercises in drawing straight lines and geometrical figures formed by them. Delineation of bodies with plane surfaces, with explanations of the nature of vision, and of the most simple phenomena of perspective, illustrated by single objects, or groups of objects, of suitable size. Exercises in drawing curved lines and simple ornaments formed of these. Outline delineation of symmetrical ornaments and vessels from cartoons and plaster casts in slight relief, of simple antique artistic forms.

Course II.

Religion.—According to the doctrines of the church.

Algebra.—Imaginary quantities and calculations with these. Logarithms, general quantities of these. Calculations with logarithms.

Arithmetical and geometrical progression. Addition of these. Convergence and divergence of the geometrical series. Application of the results obtained to calculations of compound interest, annuities, insurance computations, and to political arithmetic in general.

Permutations, variations, and combinations, their application to the calculation of probabilities, to the binomial and polynomial theorems, then to the theory of the higher algebraical equations.

Connection between the roots and the co-efficients of an equation.

Solution of equations according to the improved Newtonian method.

Solution of cubic equations (Cardan's formula).

Plane Geometry.—Similarity of the triangle, the square, and polygons.

Similarity of figures with respect to their contents. Transformation and division of figures. Calculation of their superficial contents. Regular figures in and around the circle. Proportions of their superficial contents, the peripheries and the lines occurring in these. Calculation of the contents of the circle, and determination of the proportion between its circumference and its diameter.

Natural History.—The course of instruction should begin with the anatomical structure of the human frame, the structure of the bones, and the limbs of the skeleton; and the system of the organs of the most important vital functions, such as respiration, assimilation, motion and sensation, being illustrated by models or correct delineations.

After this, the nature of the divers classes, orders, and species of animals should be demonstrated, with the help either of skeletons or stuffed or otherwise well-formed specimens, or, failing these, of correct drawings.

Then the most important principles of morphology and terminology, accompanied by demonstration on living plants, should be taught; and Linne's classification, with special reference to the natural groups comprised in the system, should be well studied.

For these lessons, plants in bloom should be selected in preference, and their value in agriculture, in the management of forests, in technology, &c., should be pointed out, as should also be done in the lessons concerning animals.

German Language—Reading of, and explanatory observations on, select extracts from German literature should be accompanied by a concise theory of German composition, and more particularly with reference to the combination, order, and proper expression of thought, with special notice of the figures of rhetoric.

With the reading and recitation of prose and poetry should be combined a short sketch of the nature and character of different styles and of the different orders of poetry.

Exercises in statement of the course of thought underlying the various extracts which have been read.

Making abstracts. Exercises in composition, more especially in the form of treatises.

Latin Language.—Subjects for reading: Justinus or Curtius, and Virgil's "Æneid."

French Language.—Syntax. Verbal and written exercises in translating from German into French, and from French into German, from a suitable book. Committing to memory French dialogues as an exercise in conversational language.

Geography. — America, Asia, Africa, and Australia (tropical, physical, and political), and with special reference to the European colonies.

Summary.—Survey of the geography of the various European States, with special notice of the most important politico-statistical circumstances connected with them.

Drawing.—Free drawing. Division and proportion of the separate parts of the human frame drawn from cartoons. Foreshortening of the several parts in different positions, then of the whole body, using the geometrical lay figure as a model. More elaborate ornaments in outline from embossed and plane models.

Linear Drawing.—Exercises in the use of rules, compasses, and other instruments by delineation and division of plane figures. Explanation of the planes of projection. Exercises in the delineation of simple bodies by means of their projections, with use of the prismatic compass when copying from cartoons. Measurement and projection of solid models in different positions, and according to different scales of reduction.

Course III.

Religion.—According to the doctrines of the church.

Solid Geometry.—Points, straight lines, and planes in space; their reciprocal positions and inclinations. Angles of solids. Relations of their solid and plane angles.

The triangle.—Supplementary triangles, and their relations to each other. Solids.

Prisms, paralleppidons, pyramids, and their sections by planes; their proper ties, and their relations to each other. Regular polyhedrons. Calculation of the cubic contents and of the surfaces of entire solids and of their sections. Cylinders and cones, and their plane sections. Relations of their cubic contents, surfaces, and sections.

The sphere and its section by planes. The triangle of the sphere. Properties of this.

The polar triangle, determination of the contents of the spherical surface, the zone and the segment, and determination of the cubic

contents of the sphere of the sector, of the segment, and of some rotatory solids (*Rotationskörper*). Calculation of the cubic contents of hollow and of compsosite bodies.

Transformation of bodies.—Exercises.

Algebra and Trigonometry.—Constant and variable quantities. Functions. Transformation of fractional algebraic functions into series. Logarithmical and exponential functions. Transformation of these into series; application of these series to the calculation of logarithms.

The functions of the circle and their mutual relations. The functions of the sums and differences of arcs. Relations between the functions of complex (*vielfachen*) and simple arcs. Development of the circle. Functions in series according to the increasing powers of the arc. Application of these series to the calculation of the functions of the circle and their logarithms for determined (*vestimente*) arcs. Reversion of these series. Application of the functions of the circle to the solution of cubic equations. Plane trigonometry. Development of relations between the sides and the angles of a plane triangle. Application of this to finding out of three given parts of a triangle, the three other parts, and the superficial contents of the triangle. Application of trigonometry to the dstermination of the heights and distances of inaccessible points, &c.

Spherical Trigonometry.—Properties of the spherical triangle. The polar triangle and its relation to the parts given. Relations between the sides and angles of the spherical triangle. The Neperian analogies. Application of these relations to the determination from three given parts of the spherical triangle of the three other parts.

Physics.—Natural forces and natural laws. Experimental and mathematical proof of the latter. Parallelogram of the forces. Derivation of the law of the lever from this. Bulk. Motion. Velocity. Uniform motion and uniformly increasing velocity. Gravity as a power producing uniformly increasing velocity (Attwood's machine). Absolute and specific weight. The centre of gravity, with experiments in determining its seat. The balance and the conditions of its sensitiveness. The inclined plane. The pendulum. Centrifugal and centripetal motion. Different conditions of aggregation and their characteristics.

Fluid Bodies.—Vertical and lateral pressure. The hydrostatic balance. Pressure on a fluid and uniform transmission of the same. Theory and application of the ordinary (*Real*) and the hydraulic press. Form of the surface of a fluid in a state of quiescence. Pressure of fluids on bodies immersed in them. The theory of floatation. Determination of the specific weights of solid and fluid bodies by means of the hydrostatic balance. Areometry.

Aëriform Bodies.—Characteristics of this form of aggregation. Uniform transmission of the pressure on an aëriform body. Atmospheric air. Pressure of the atmosphere. The barometer and correction of its indications. Mariott's law. Oersted's apparatus for the compression of gases. The manometer. The syphon and pumps. The air-pump and its applications. Specific gravity of the air. The fire-engine. Loss of weight by bodies in the air. True weight of bodies. The balloon.

Sound.—Generation of sound. Its transmission force, and reflexion. The vibrations of elastic cords and planes. Tubes for conveying sound (*Communications Röhre*), the speaking trumpet and the ear trumpet.

Light.—Rectilinear transmission of light in homogenous menstrua, and the consequences thereof. Shadow, angle of vision, and apparent

size. Intensity and velocity of light. Photometry. Theory of the plane, the concave, and the convex mirror. Special notice of the paraboli form, concave mirror, and its applications. Simple refraction of light. The exponent of refraction. The theory of lenses (*gläser*). Decomposition of the rays of light. The prism: optical instruments, such as, the camera obscura, the camera encida, simple and complex microscopes, and the solar microscope. The telescope. The construction of the eye. Photography.

Heat.—Expansion of bodies by heat. Thermometry. Free, latent, and specific heat. Capacity of heat. Radiating heat. Calorimetry. The co-efficients of expansion. Vapour and steam. Their elasticity, density, and latent heat. Principle of the steam-engine. Heated steam (*Dampefheizung*). Hygrometry. Generation of heat by combustion.

Magnetism.—Natural and artificial magnetism. The magnet and its poles. The needle of declination, and the needle of inclination. The earth a magnet. Means of inducing magnetism. Electricity excited by friction and division. The electric machine. The Leydenfar, the electrophorus, and condensator. Aerial electricity. The lightning rod. Galvanic electricity. The galvanic current. Phenomena of the open and the closed battery. The constant pile. Chemical, optical, thermal, physiological, and electro-dynamical effects of the current. Orsted's discoveries, and the fundamental phenomena of electro-magnetism. The galvanometer, and variation compass. Ohm's law. Application of electro-magnetism to telegraphy. Induced currents and magnetic electric induction.

Descriptive Geometry.—Representation of points, straight lines and planes by means of their projections and traces. Determination of their mutual positions, inclinations, and intersections. Representation of equilateral bodies, their sections by planes, their reciprocal intersections, &c. Determination of points, lines, and planes which fulfil certain given conditions. Solution of the problems of the solid triangle. The logometrical (*logometriche*) projection of solids. Plane curves. The laws of their formation. Developable planes, their generation and representation. The planes of cylinders and cones, their properties, and their reciprocal relations. Determination of tangential planes. Section of these two surfaces by planes. Conic sections. Determina of the tangents and the normals. The reciprocal intersection of these two surfaces (*Fläche*). Determination of the tangents of the intersecting curves. Development of these surfaces, and of the curves that cut and intersect them.

German Language.—The most important rules of prosody, and of metrical composition. The leading points of the history of literature, combined with the reading of select extracts from the works of the authors touched upon. Explanation of these literary specimens with reference to form as well as contents, and statement of the logical disposition of the ideas. Verbal and written exercises in logical arrangement of thoughts. Composition of themes in the style under consideration.

Latin Language.—Authors to be read: Livius and Sallustius.

French Language.—The most important rules of composition, particularly of letters, combined with exercise in translating German into French. Reading of classical authors (prose), with literary analysis, and special reference to synonymes and Gallicisms. Exercises in conversation.

History.—History of antiquity, more particularly of the Greeks

and Romans, also mediæval history up to the period of the death of Charlemagne. The Agilolfings in Bavaria.

Drawing.—Simple exercises in shading at first from models of plane ornaments, afterwards from ornaments in relief. Drawing of heads, hands, and feet in different positions from slightly executed models. Ornaments belonging to various periods of art, as much as possible in connection with architectural features.

Linear Drawing.—Measurement of complex solid models with plane surfaces, and projection of the same according to the rules of descriptive geometry, and to a given scale of reduction, and in a prescribed position.

Embossing.—Modelling of ornaments in relief, first from solid models, and then from plane patterns, and on a different scale.

Course IV.

Religion.—According to the doctrines of the church.

Elements of Higher Analysis.—Indication of the difference, of the differential, and of the differential quotient, or derivative function. Differentiation of sums and products. Differentiation of the functions of functions. Repeated differentiations. Taylor's series. Maxima and minima.

Definite and indefinite integrals. Integration of differential forms of the first degree, and with one fluxion (*Veranderliche*). Integration of entire algebraical differential formulas. Integration of fractional, algebraic, differential formulas. Integration of irrational, algebraic, differential formulas.

Analytical Geometry.—Determination of the position of a point by means of rectilinear and polar co-ordinates. Equations of straight lines. Equations of conic sections and their properties. Points of contact of straight lines and curves. Tangents, normals, sub-tangents, and sub-normals.

Equations of cycloid, epicycloyd, and hypocycloids, of the evolvent of the evolute of the circle, and of the conchoide. Equations of straight lines of solids and planes.

Descriptive Geometry.—Spiral surfaces in general, their generation, and properties. The hyperbolic paraboloid, the hyperboloid of one sheet, the convoid, the spiral screw surface (*die windschiefe Schraubenfläche*). Determination of the tangential plane when the point of contact is given, or other conditions are stated. Section of these surfaces by planes. The reciprocal intersection (*Durchdringung*) of these surfaces, and their intersection of and by the developable surfaces.

Tangents of the curves of section and intersection (*Schnitt-und Durchdringungscurven*). Surfaces of rotation, their generation and properties. The hyperboloid, and ellipsoid of rotation. The sphere.

Determination of the tangential planes of given points of contact, as of other conditions. The sections of these surfaces by planes. Determination of the curves of the reciprocal intersection of these surfaces, and of their intersection of and by the spiral and developable surfaces. Cylinders and cones tanguential to given planes. Determination of the curves of contact.

Planes tangential to several surfaces at once.

Application of descriptive geometry.

Determination of the shadows of bodies caused by parallel, or concentric rays of light. Elements of perspective.

Mineralogy.—Description of the stones, earths, salts, combustible fossils and metals and ores in most common use, based upon specimens

exhibited, must be combined with the lessons in chemisty connected with these substances.

Chemistry.—Simple and compound chemical substances and their classification, with omission of such substances the nature of which is still doubtful, or the use of which has not been discovered. Chemical changes which extend to an alteration in the condition of cohesion, more especially amorphism, crystallisation, systems of crystallisation. Modifications. Transitions. Point of saturation. Hypersaturation. Point of fusion. Neutralisation. Inorganic chemistry. Chemistry. Atmospheric air, water, acids, alkalis, alkaline earths, earths proper (*eigentliche Erden*) with description of their radicals. Salts. Capacity of saturation. Calculation of this in all oxysalts. Series of neutrals (*neutralitätereihen*).

Metals in common use, their combinations of the first and higher class. Alloyage, combining weight, and calculation of this with reference to the most important metals, and also to a selection of radicals of acids and bases.

Organic Chemistry.—The most important organic acids and alkaloids, as also the best known substances containing carbonic acid, and others not containing carbonic acid, such as animal and vegetable filaments, starch, gluten, gum, sugar, albumen, fat, rosin, oils, substances containing glue (*Leim*) and the principal products of their decomposition by means of fermentation and dry distillation.

Latin Language.—Subjects to be read. The least difficult orations of Cicero, or a choice of Phinies's writings.

French Language.—Summary statement of the rules of French prosody. Exercises in translating longer consecutive pieces from German into French. Reading of French prose and poetry, and conversations on literary history in French.

English.—Reading and instruction in rules of pronunciation, etymology, and syntax. Translations from German into English and from English into German. Exercises in conversation.

History.—Continuation of the history of the middle ages, dwelling more particularly on German history, and including the most important events in the history of Bavaria. Modern German and Bavarian History down to the latest times, including such important events, in the history of neighbouring nations, as are necessary for a correct understanding of German history.

Drawing.—Delineation of animal and vegetable forms, if possible, from models in relief, and with strict attention to foreshortening and bends. Elucidation of styles and exercises therein. Delineation of figures from simple plane models. Ornaments in combination with human and animal forms, from the plane and from the round.

Linear Drawing.—Projection of solids with curved surfaces and their intersections (*Durchdringungen*). Delineation of the different orders of columns from cartoons. Exercises in linear perspective and shading.

Modelling.

§ 36. Regulates the method of teaching (which is to be by verbal delivery, question and answer, as in the lower schools), and the books to be used.

Chapter IV.

Regulates the division of the school year, the conditions of the admission and advancement, and dimission of the pupils, the system of examinations, &c.

The age of admission into the first course must not be under 13,

and the candidate must be in possession of the knowledge imparted in the four classes of the classical schools.

A pupil, who after attending for two years one of the lower courses, and is not competent to enter the one immediately above it, is dismissed from the school.

Annual examinations, written and verbal, take place, and on leaving the institution after having gone through all the courses of instruction, pupils may demand to be specially examined, and in that case obtain a certificate, termed absolutorium.

The written examination for the absolutorium extends over three days, and comprises on the first day:

1. A religious theme, to be completed in one hour.
2. An essay in German on some given historical subject, to be completed in three hours.
3. A problem in descriptive geometry, to be completed in two hours.
4. Two themes, one in zoology, one in botany, to be completed in one hour.

Second day:

1. The solution of two problems, one in the lower and one in the higher analysis, to be completed in two hours.
2. The solution of two problems, one in elementary and one in analytical geometry, also to be completed in two hours.
3. Two themes in physics, each to be completed in one hour.
4. A composition in French, to be coplemted in two hours.

Third day:

1. The solution of two problems in trigonometry, in two hours.
2. Two themes in chemistry, one to have reference to mineralogy, in one hour.
3. A composition in Latin, to be completed in two hours, and
4. A composition in English, to be completed in two hours.

Chapter V.

Treats of the school authorities and the discipline of the school, and lays down rules for the annual reports to be made.

Third Section.—The Polytechnic School.

Chapter I.—*Aim of the Institution and general Extent of the Instruction to be given.*

§ 61. In the organic system of the technical institutions, the polytechnic school stands in immediate connection with the technical gymnasium, and forms the apex of the system of technical instruction.

It is divided into—

a. A general class, and

b. Special classes for individual branches of technical business.

§ 62. The general class or division comprises a course of two years, and its object is to impart instruction in the mathematical and natural sciences, and the art of drawing to the extent required to make them a general foundation for the commencement of separate branches of technical studies, and at the same time to constitute a course of general scientific culture.

The special classes are to impart knowledge of and skill in the particular sciences required in individual branches of technical business, and these studies, in organic connection with the studies of the general class, are to complete the technical professional education.

§ 63. The polytechnic school comprises four special classes or or divisions:—

a. For architecture, the course extending over two years.

b. For mechanical engineering, the course extending over two years.

c. For technical chemistry (*Chemische Technic*), the course extending over two years.

d. For trade and commerce, the course extending over one year.

The principal object of the polytechnic school is to treat the different professional studies independent of each other.

The preliminary studies lead up to these, and must therefore precede these in the degree prescribed and deemed necessary.

In order that the regular gradations which are considered absolutely necessary may be observed, the students must strictly follow the course of instruction laid down.

The students shall be called "pupils" (*Eleven*).

Chapter II.—*Summary of the Branches of Study in the Separate Divisions.*

Number of Lessons.

§ 64. A. General Division.

Course I.

	Semester. I.	II.
	Hours in the Week.	
Analytical geometry	3	3
Differential and integral calculus	4	4
Analytical mechanics	5	5
Mathematical physics	6	0
Applied physics with practical exercises	0	6
Elements of architectural construction	6	6
Elements of machine construction	6	6
Free drawing	6	6
Elementary mechanics	5	5
Zoology	5	0
Botany	0	5
Political Economy	4	0
French language	3	3
Italian language	3	3
History of German literature	2	2

Course II.

Applied mechanics	5	5
Application of descriptive geometry to perspective, shading, and stone-cutting	3	3
General chemistry	4	0
Special chemistry	0	4
Oryctognosy	4	0
Geology	0	4
Architectural designing (construction and architectural forms)	6	6
Machine designing (elements of construction)	6	6
General knowledge of machinery	6	6
Constitutional and administrative law	4	0
French language	3	3
English language	3	3
Italian language	3	3

B. Special Divisions.

1st Architectural Class.

On entering this class the pupil is supposed to be in possession of such knowledge of the subjoined subjects as is taught in the two courses of the general division.

Analytical geometry, differential and integral calculus, analytical and applied mechanics, mathematical and applied physics, general and special chemistry, applied descriptive geometry, oryctognosy, geology, architectural and mechanical designing, drawing (the latter studied during two hours a week), and political economy.

Course I.

a. For architects and building-engineers in common.

	Semester I.	Semester II.
	Hours in the Week.	
General civil engineering	2	2
Knowledge of building materials, and of sanitary matters connected with building	0	4
Estimates of cost, and conditions of contract	4	0
Plan drawing (*Situations zeichnen*)	4	4
(b.) *Separate Instruction for Architects.*		
Architectural styles and history of architecture	4	4
Plans of elevation (*Hochbauten*)	14	14
Figure and landscape drawing	4	4
Separate Instruction for Building Engineers.		
Bridge building	4	4
Plans of bridges	8	8
Geodosy and hygrometry	6	6
The construction of machinery	4	4

Course II.

(a.) *For Architects and Building Engineers in common.*

Plans of architectural buildings	6	6
Plans of engineering works of construction	6	6
Stone cutting and modelling	0	4
Constitutional and administrative law	4	0

(b.) *Separate Instruction.*

For Architects.

History of architecture	2	2
Elements of the science of road building, bridge building, and the construction of waterworks	2	2
Measurement	0	4
Plans of architectural buildings	12	8
For Engineers.		
Science of road making and of constructing water-works	6	6
History of engineering	2	2
Plans of engineering works	8	8

II. For Mechanical Engineering.

On entering this division the pupil is supposed to be in possession of such knowledge of the subjoined subjects as is imparted in the two courses of the general division:

Differential and integral calculus, analytical geometry, the application of descriptive geometry, mathematical and applied physics, designing (architectural and mechanical), general knowledge of machinery, analytical and applied mechanics, general and special chemistry, geology.

Course II.

	Semester I.	Semester II.
	Hours in the Week.	
Theory of machinery (*Maschinenlehre*)	4	4
Construction of machinery	4	4
Exercises in designing	8	8
Railway, canal, &c., engineering	3	0
Leveling and measurements	0	4
Manufacturing engineering (*Fabrikban*)	0	3
Metallurgy	5	0
Technology (of manufactures, building trades, and implement making)	0	0
Excursions: practical work in the mechanical workshops	0	0

III. For Technical Chemistry.

On entering this division the pupil is supposed to be in possession of such knowledge of the subjoined subjects as is imparted in the two courses of the general division:

Zoology, botany, oryktognosy, geology, mathematical and applied physics, general and special chemistry, architectural drawing.

Course I.

	Semester I.	Semester II.
	Hours in the Week.	
Elementary mechanics	5	5
Technical physics (pyrotechnics)	4	0
Technical chemistry	5	5
Elements of mechanical designing	6	6
Knowledge of building materials	0	4
Political economy	4	0
Work in the laboratory	0	0

Course II.

General theory of machinery	6	6
General civil engineering	2	2
Metallurgy, including smelting and casting ..	5	0
Physical chemistry	5	0
Technology	5	5
Work in the laboratory	0	0

IV. *For Trade and Commerce.*

SOLE COURSE.

	Semester I.	Semester II.
	Hours in the Week	
Theory of commerce, including the sciences of the counting-house	6	6
Commercial geography and commercial statistics	2	2
History of commerce	0	2
Laws relating to commerce and bills of exchange	0	3
Political arithmetic	0	3
Commercial arithmetic	3	0
Knowledge of goods	3	3
Mechanics (as applied to the means of transport)	0	2
Political economy	4	0
Constitutional and administrative law	4	0
French language	3	3
English	3	3
Italian	3	3
Mercantile correspondence in French and English	0	3

§ 65. Previous to the commencement of a term of studies, the directors of the establishment must determine, with the aid of the masters of the various divisions, the programme of studies, and this must then be published.

CHAPTER III.

Relates to the division of the school year, and the admission, advancement, and dimission of pupils.

The conditions of admission are: the necessary preliminary knowledge, and good moral conduct.

The pupils of the general division are bound to take part in the lessons on at least five subjects in each semester.

The pupils in the special divisions are bound to take part in all the studies mentioned in the programme of the division.

Admission into the Polytechnic School is only granted to those who can produce a certificate of having passed the absolutorium of a technical gymnasium, or who will submit to examination in all the subjects of study professed in those institutions.

Admission to pupils or hospitants, who wish to attend only some particular lessons, is, however, granted on less difficult conditions.

On entering the Polytechnic School, regular pupils and hospitantes, must pay an admission fee of 5 florins.

The school honorarium is 20 florins per semester. Hospitantes pay 4 or 6 florins, according to the number of lessons they take weekly.

For participation in the work of the laboratory, pupils pay 15 florins, and hospitantes 20 florins.

Individuals giving proof of special worth and abilities, and at the same time of incapacity to pay, may be absolved from payment of the above fees.

An absolutorial examination is held at the close of each school year, the subject of examination being fixed by the professors in council.

CHAPTER V.

Treats of the school authorities and school discipline.

Annual Report on the Condition of the Male and Female Sunday and Holiday Schools in Munich for 1866–67.

Bavaria.

Preliminary Observations.

Every ordinary parish school has attached to it a holiday school, which is, therefore, called a parish holiday school, and which consists of three classes designated by the numbers I, II, and III.

There is an addition to this, a central holiday educational institution, which embraces the whole city, and which has also three subdivisions, viz.:—

(*a.*) The central holiday school, an elementary school with three morning and three afternoon classes, designated by the numbers IV, V, VI.

This central holiday school is not, however, supplementary to, or a continuation of the parish holiday schools in so far that scholars must necessarily pass into it from these latter. It obtains its scholars from among such as have (1) passed through course IV, (2) who having performed their duty in the week-day schools have left these with certificate No. I, and (3) who leaving a higher educational institution, after the probationary months, have returned to the workshop. Such pupils must not be admitted into the parish holiday schools, but must be sent to the central holiday school.

(Pupils who are guilty of any serious misconduct, or who are incorrigibly indolent and negligent, are sent as a punishment, to the parish holiday school.

(*b.*) The journeymen's school.—This embraces four classes and imparts, during one hour of the morning, elementary instruction to journeymen, who are either still within the age fixed for attendance at school, or who feeling the deficiencies of the school instruction they have previously received, voluntarily enter their names in this institution. This being once done, they are, like the other scholars, bound to attend during the whole year.

(*c.*) The holiday school for handicrafts, in which instruction is given in—

1. Geometry and arithmetic.
2. Physics.
3. Technical chemistry.
4. Descriptive geometry, theory of machinery and mechanical designing.
5. Practical mechanics.
6. Free-hand, geometrical, and architectural drawing.

The last branch of instruction is divided into five regularly organized classes, four of which have of late years had to be subdivided into eight parallel classes, on account of the great number of students attending them.

The uniformity of the instruction given, and its regularly progressive character is insured by the supervision of a technical director, under whom rank also the holiday drawing schools in the suburbs of Au, Haidhusen, and Giesing, which form branches (*Filialen*) of the central drawing school.

This central school is so regulated as to be in strict harmony with the system of drawing instruction introduced into all the week-day schools, and which offer to the young men of the present day opportunities for improving themselves in an art which has within the last seven or eight years become of such great importance to industry.

It must be observed that in the instruction given in this institution each handicraft is taken into due account, so that each pupil may obtain the knowledge specially required for his trade.

With the holiday school for handicrafts is connected a lithographic establishment, which supplies the drawing schools with systematically arranged models, and thus maintains the regularly progressive character of these.

The schools enumerated under *a*, *b*, and *c*, constitute together one great whole, under the superintendence of a special inspector. The guidance of it is, however, beset by great difficulties, and demands an amount of tact and energy which will be easily appreciated by those who know, by actual intercourse with them, the character of our prentice boys. It is, therefore, the more to be admired that among so large a number of scholars brought into such close contact with each other, so few aberrations should have taken place.

The results of the instruction imparted and of the school discipline would, however, be far more satisfactory if fathers and workmasters would, as was the custom of old, keep a more watchful eye on the youths.

As to the male parish holiday schools (10 in number, with 26 classes), there is but little to be said of them, except that they are, if possible, more than ever the plague of all who have anything to do with them. The evils which prevail in these schools have been so frequently touched upon, and are so well known, that it is unnecessary to dwell further on them; we can only hope that the impatiently awaited new school laws will introduce improvements which school and school authorities are unable to achieve, without the aid of the families of the scholars.

The female holiday schools are, like the male schools, divided into:—

a. A central holiday school; and

b. Parish holiday schools.

The first mentioned consists of three classes, which, to distinguish them from the lower holiday schools, are designated by the numbers IV, V, and VI. No. IV is, on account of the great number of scholars, subdivided into three classes, viz., A, B, and C; and instruction is given both in the morning and in the afternoon, in order to render it more easy for the girls to attend.

With this school is connected a so-called preliminary division, in which girls who have been unfavourably situated with regard to the attainment of education are enabled to obtain proper instruction. This division has been incorporated with the central holiday school, because, as in its object and its methods of teaching it holds an exceptional position, it would otherwise be quite isolated; and because, were the pupils who frequent it to be distributed among the parish schools, they would fail to obtain the special attention which their case requires.

In connection with this school there is also a class for instruction in partial work, which is open to girls who have already gone to service, as well as to others.

The elementary instruction, which increases in each class, and which in classes V and VI extends to practical life, was, during the last year, attended by 504 girls, and the working class by 125 girls.

In all its features, both as regards the teachers and the greater number of the scholars in, their efforts to impart and to attain culture and dignity, this school offers a most attractive picture of what holiday schools may be.

b. The parish holiday schools for girls, of which there were during the year 11, with 27 classes, also effect much that is good and useful yet it cannot be denied that their effectiveness might be far greater. The chief obstacle to their activity is not only the lukewarmness of the scholars themselves, but more especially the contempt in which the schools are held by many parents and employers.

Prizes, mostly consisting of money, are annually distributed in all these schools, and the names of the scholars who have distinguished themselves by steady industry are published in the yearly reports.

During the school year 1866–67, the number of pupils attending these various schools and classes has been as follows:

The Sunday and holiday school for handicrafts:*

	Pupils.
Religious classes	208
Arithmetic and geometry	65
Physics	64
Technical chemistry	99
Descriptive geometry	62
Theory of machinery	79
Designing	63
Practical mechanics	50
Embossing	77
Chasing	22
Architectural drawing	88
Linear	299
More advanced ornamental drawing	367
Free hand drawing and elements of ornamentation	296
The journeyman's school (*Gesellen Schule*)	167
The central holiday school for boys	341
The parish holiday schools for boys	1467
The central holiday school for girls	644
The parish holiday schools for girls	1303

Annual Report of the Royal District Industrial School, in Passau, for the school year 1866–1867.†

BAVARIA.

Pieces.

The preliminary knowledge required for admission into this School is—

a. Proper religious instruction.

b. Facility in reading, writing from dictation, and in the power of composing a simple theme without committing any gross fault of grammar or orthography.

c. A certain amount of readiness in doing sums in the four rules of arithmetic with known or unknown numbers.

Only trade apprentices are admitted as hospitants.

The number of masters is fourteen, exclusive of the rector, or, head master.

* This school seems to be parallel with the higher industrial schools mentioned in the Decree of Reorganization of 1864.—[TRANS.]

† For organization of these schools and subjects taught in them, see Decree of Reorganization of Technical Schools in Bavaria, 1864.

The number of scholars attending Course I of the industrial division, was	26
Course II	13
Hospitant	1
Course III	3
Hospitant	1
The number of scholars attending the I Course of the commercial division, was	31
Hospitant	1
Course II	16
Hospitant	1
Course III	7
Hospitant	1

The higher industrial school (*Gewerbliche Fortbildungs Schule*), organized according to the rules laid down in the decree of 1864, was open on the 4th November, 1866, for instruction on Sunday mornings; the week-day evening classes did not, however, commence until February, 1867.

The attendance in the various classes, which is quite voluntary, has been most satisfactory, the majority of the students having been adults, mostly apprentices and assistants (*Gehilfen*), whose industry and perseverance has earned for them honourable mention in the report. Some of the classes were also attended by work masters.

The number of masters, including the rector, is five.

The number of students attending the various divisions and classes during the year was as follows.—

Elementary division:

Bookeeping and other branches of commercial science .. 72

Of these, 35 were apprentices and 37 assistants.

Drawing class in elementary division 46

All apprentices.

Special division:

Drawing in its various branches 43

23 apprentices, 10 journeymen, and 10 commercial scholars.

Geometry 17

13 apprentices and 4 assistants.

Natural philosophy 15

14 apprentices and 1 assistant.

Chemistry and technology 32

24 journeymen and 8 apprentices.

In connection with this school there is a school of weaving, which is a week-day as well as a Sunday school, and which embraces practical weaving in all its branches, and a knowledge of the various kinds of weaving from the simplest to the most complicated, and of their various parts and the preparatory processes connected with them, and also special instruction in the cultivation of hemp and flax, and in all matters connected with the preparation of these substances into raw material for the weaver.

The only difference between the week day and the Sunday classes is, that in the former, the work can be more thoroughly carried out.

The number of pupils attending the week-day classes in the course of the year was 12; of those attending the Sunday classes, 33. Of these 23 were journeymen, and 10 apprentices.

In connection with these schools the Government has encouraged regular conferences of weavers in which opportunities are given to

acquire a knowledge of new processes and machinery, and which are said to work very satisfactorily.

Annual Report of the Royal District Industrial or Technical School in Murich, 1866-67.

This school organized on the plan of the decree of 1864, opened with 300 scholars, distributed as follows, among the different divisions and courses:—

			Scholars.
Course I.	Division A	.. ..	98
„ I.	„ B	.. ..	98
„ II.	„ A	.. ..	38
„ II.	„ B	.. ..	39
„ III.	„	.. ..	27
			300

Annual Report of Royal Industrial School in London, 1866-67.

The number of scholars attending this school during the year, was 324. Of these 113 were regular scholars, 90 pupils of the popular schools, who attended the drawing lessons, only 9 assistants of the workshops, and 112 apprentices and artisans attending the Sunday and holiday drawing classes.

Annual Report of the Royal District Technical School and the Higher Technical School connected with it in Regensburg, 1866-67.

The number of scholars attending this school during the year was 337, among which 199 apprentices within the age prescribed for attendance at school.

A large number of the pupils are mentioned in the Report with commendation.

The attendance in the various classes was as follows:—The Drawing Division A, 36; Division B, 45; Division C, 89; Division D, 65; Division E, 40; German Language and Arithmetic, Division A, 123; German, Division B, 93; Arithmetic, Division B, 70; Geometry, 91; Physics, 70; Chemistry, 15.

Annual Report of the Royal District Industrial and Commercial School and the Higher Technical School in Bayreuth, 1866-67.

The industrial school was attended in the course of the year by 99 scholars; the Higher Technical School by 114, all of whom belonged to some trade or handicraft.

The attendance in the different classes was as follows:—

	Pupils.
Free-hand drawing	68
Elementary linear drawing	41
Arithmetic	33
German language	28
Architectural drawing	45

	Pupils.
Geometry	9
Mechanics	13
Chemistry	9
Physics	16
Book-keeping used in trades	27
Embossing	10

The report mentions, with thanks, a public declaration of the commercial classes of the town, that in filling up vacancies in their counting-houses, &c., they would give the preference to pupils of the school, and more especially to such as have attended the highest course and have the best marks.

Annual Report of the Royal Industrial School and of the Higher Technical School attached to it, in Hof, 1866-67.

The industrial school was attended by 99 scholars, the higher school by 284 journeymen and apprentices, of whom 103 attended the elementary division, and 181 special divisions.

Annual Report of the Royal Industrial School and the Higher Technical School attached to it, in Bamburg, 1866-67.

The two schools together were attended in the course of the year by 553 scholars and students, distributed as follows:—

In the industrial and commercial division:—

	Pupils.
1. Regular scholars	194
2. Hospitants:	
a. In the scientific classes	37
b. In the technical classes	1
3. Commercial pupils	25
In the higher technical school:—	
1. Elementary division:	
a. Regular scholars	84
b. Hospitants	141
2. In the special divisions	53

In addition to the subjects stipulated in the Decree of Reorganization of 1864, the pupils of these schools received instruction in singing, gymnastics, and swimming.

Annual Report of the Royal Industrial School in Ansbach, 1866-67.

The industrial school was attended by 53 scholars, and the higher technical school attached to it by 159 journeymen and 4 apprentices, all in the elementary division. For the special techincal classes no pupils entered their names.

Annual Report of the Royal Industrial and Commercial School in Fürth, Middle Franconia, 1866-67.

The number of pupils attending this school in the course of the year was:—

	Pupils.
In the industrial division	53
Hospitants	4
In the commercial division..	113
Hospitants	2
	182

The increase since last year was 24, the whole of which number applies to the industrial division.

The higher technical school was frequented in the—

a. Theoretical classes by 97 apprentices and journeymen;

b. Drawing and modelling classes by 398 apprentices and journeymen, since the previous year.

These numbers show a diminution of 94 in the drawing classes, and an increase of 97 (2 work-masters, 20 journeymen, and 75 apprentices) in the theoretical classes. The increase is attributed to the opening of classes for bookkeeping and general business management in connection with industrial pursuits, these classes having been very diligently attended by 2 masters, 7 journeymen, and 25 apprentices.

The falling-off in the drawing classes is attributed to the fact of attendance in these higher industrial schools being entirely optional.

Annual Report of the Royal District Industrial School in Augsburg. 1866–67.

157 scholars (24 of which came from classical schools) inscribed themselves at the beginning of the school year. Of these 11 were rejected on account of insufficient preliminary knowledge. The remaining 146, added to the 133 industrial scholars, and 1 hospitant remaining from the previous year, gives a total of 281 for the year, distributed as follows:—

	Scholars.
3rd or highest course	18
2nd or middle course	
Division A	40
Division B	33
1st or lowest course	
Industrial division A	40
Industrial division B	45
Commercial division A	45
Commercial division B	60

Annual Report of the Royal Industrial School, and the Higher Technical School at Kempten, 1866–67.

The number of pupils who inscribed their names at the beginning of the school year was 108, distributed as follows:—

		Pupils.
Course I	Industrial division	33
„ I	Commercial „	25
„ II	Industrial „	21
„ II	Commercial „	12
„ III	Industrial „	7
„ III	Commeraial „	2
	Hospitants	8
		108

In the higher technical school the number of pupils inscribed was, in the winter semester, 62, of whom 19 attended the first division, 21 the second, and 16 the third, while 6 attended the drawing lessons only. At the close of the semester 18 left.

In the summer semester there were added to the 44 remaining scholars 26 new ones, making the total 70, 32 of whom joined the first division, 18 the second, and 10 the third. The remaining 10 attended the drawing classes only.

Annual Report of the Royal Industrial School, and the Higher Technical School, in Nördlingen.

The number of scholars inscribed during the year in the industrial school was 95, distributed as follows :—

	Scholars.	
In the first course	0	
Of the industrial division *a* ..	45	
Of the commercial division *b* ..	9	
In the second course	15	
In the third course	3	
In all the courses	10	Hospitants in several classes.
„ „	13	Hospitants in drawing classes only.

In the higher technical school the number of pupils was 149. Their participation in the various branches of instruction was as follows :—

	Assistants and Journeymen.	Apprentices.
Drawing	38	86
Geometrical construction	15	49
Embossing	2	4
Geometrical calculation	0	9
Arithmetic	0	41
Chemistry and chemical technology	0	10
Physics	0	19
Bookkeeping, &c.	0	17

Annual Report of the Royal Industrial School, and the Higher Technical School connected with it, and of the Elementary Drawing School in Lindau, 1866–67.

The number of pupils receiving instruction in these three schools during the year was—

In the industrial school	85 scholars 3 hospitants
In the higher technical school ..	91 apprentices
In the elementary drawing school..	72 scholars
	251

A number which, according to the circumstances of the locality, is considered very satisfactory.

The report nevertheless mentions with regret the great disproportion between the attendance in the two lower courses, and the third, or highest, and attributes this to the fact that parents are not sufficiently alive to the advantages of a thorough education, but hasten to apprentice their sons as soon as they have been confirmed. The attendance in the different courses of the industrial school was as follows :—

Industrial division:		
Course I	20	3 hospitants.
„ II	14	
„ III..	4	
Commercial division:		
Course I		21
„ II		20
„ III..		6*

Annual Report of the Royal Technical Gymnasium in Nürnberg, 1866–67.

The report opens with some preliminary observations in justification of the plan adopted in the organization of the gymnasium, of combining classical studies with the study of modern languages and the practical sciences, pointing out that all true culture must be based on a knowledge of language, showing the educational value of the classical languages and literatures in stimulating, elevating, and refining the mind, and, as links between the past and the present, acknowledging the equal value of the modern sciences and languages in expanding the mind and conquering prejudice, in addition to their utilitarian importance, and concluding with the assertion, that the ideal educational institutions of the future are such as shall succeed in combining in due proportions the studies which satisfy the idealistic, with those that correspond to the realistic, tendencies and requirements of humanity.

The gymnasium being only in its second year, and all its courses not yet organized, the attendance had been but small (38 pupils in all), but very satisfactory, and a great accession of numbers was expected in consequence of the Government having determined to place the gymnasium in connection with the central institution for learning all matters connected with the management of forests, so that the absolutorium of the gymnasium will in future entitle to admission into the former institution, and also to the Government School of Mines, the pupils of which pass immediately into the service of the State.

Report of the Royal Technical Gymnasium in Augsburg, 1866–67.

The number of regular pupils in the institution at the end of the school year was 20, of hospitants, 2.

Annual Report of the Royal District Industrial School, and Royal Polytechnic School in Nürnberg, 1866–67.

The attendance in this industrial school, and the schools connected with to it, was as follows:—

District Industrial Schools.

	Scholars.
Course I, A	42
„ I, B	48
„ II, A	15
„ II, B	16
„ III..	18
Total ..	166

* All the industrial and higher technical schools named above have been organized according to the Decree of 1864, to which the reader is referred for further information respecting them. In all the schools religious teachers of the various denominations are appointed.

Elementary Drawing School.

Number of scholars .. 188

Sunday School for Handicrafts.

Number of scholars 982

In addition to the drawing lessons in which all the scholars of the Sunday school took part, instruction was received in—

	Scholars.
Arithmetic by	218
Geometry by	58
Physics by	15
Chemistry by	16
Modelling by	69

The Polytechnic Institution, which, in accordance with the Decree of Reorganization, 1864, is to break up this year was attended during the school year 1866-67 by 75 students, 20 of which were hospitants.

Annual Report of the Royal School of Machinery in Augsburg.

The conditions of admission into this :—

(*a*) A thorough knowlege of algebra (inclusive of logarithms and of equations of the second degree with one unknown quantity), and of geometry in its various branches.

(*b*). A certain amount of practice in linear drawing.

To be proved by examination, and the production of a certificate of good conduct.

The age of admission is not under 15.

Hospitants, or students attending only particular lectures, are admitted on giving proof of the preliminary knowledge requisite for a thorough understanding of the subject taught.

The objects taught in the school are :—

First or Lower Course.

Mathematics, 4 hours weekly.

Designing, 8 hours (weekly) in winter, and 10 in summer.

Second or Higher Course.

Elementary mechanics.
Differential and integral calculus.
Physics.
Mechanical engineering.
Designing.

Practical Course in the Workshop.

Practice in the use of implements and the construction of machines. These practical lessons are participated in by all the pupils during two hours daily, with the exception of Saturdays.

The number of pupils was—

In the I Course	13
In the II „	12

The annual school fee is 20 florins, exemption from payment of which may he obtained by candidates proving want of means.

Prospectus of the Royal School of Art as Applied to Trades (Kunstgewerbschule) in Nürnberg.

The object of this school is not only to promote art, but to establish a connection between art and industry, and it is adapted to the requirements of youths of above sixteen (the earliest age at which admission is granted), who desire to perfect themselves in art in connection with some industrial pursuit.

Division I.

The subjects taught, are :—

1. Drawing from ornamental models (preparatory class), 12 hours weekly.
2. Practice in architectural drawing accompanied by theoretical lectures, 12 hours weekly.
3. Drawing from antique models, 12 hours weekly.
4. Modelling and drawing ornaments and figures, 12 hours each weekly.

Division II.

1. Painting, drawing, and modelling from life, for artists.
2. Plastic studies for artists.
3. Exercises in composing and executing subjects in figures, and of an ornamental character.
4. Embossing and sculpture.
5. Wood-carving: exercises in carving ornaments and figures, and execution of objects of industrial art.
6. Brassfounding: exercises in forming, founding, and engraving.

Supplemental Classes.

1. Perspective, and the construction of shadows—2 hours weekly.
2. Anatomy—2 hours weekly.

Each branch of art is taught separately, and those branches, such as architecture, sculpture, and ornamentation, which are more immediately connected with industrial enterprise, are made the chief subjects of instruction, and are taught with special reference to the requirements of industry.

Plan of Organisation of the Weaving School at Mündeberg.

The object of this school is to impart thorough theoretical and practical instruction in weaving in all its branches, and to spread useful knowledge among the whole weaving trade, not only by the education of individual pupils, but also by affording guidance and advice to men of the trade already independently established.

In as far as the instruction given in the school is suited for other trades also, it may be participated in by hospitants belonging to those trades.

The persons for whom the school is specially intended, are young men from 14 to 22 years of age, who desire to devote themselves to the weaving trade.

The institution is intended to embrace the whole of the province of of Voigtland, in Upper Franconia, but natives of the district of Mündeberg are eligible by preference, and pupils who do not belong to the district or province can only be admitted on higher payment.

The technical teachers are bound to answer, in as far as their time will admit of it, all inquiries on instructive matters relating to the trade addressed to them by members of it.

The regular pupils are boarders; their present number is 16.

The studies are divided into two courses, the first of which embraces theoretical instruction in the primary matters relating to weaving in its various branches, and to the raw materials used for these, besides German, arithmetic, geography, drawing and religion, and practical instruction in the simpler processes connected with weaving, and weaving of plain fabrics. The second course comprises theoretical instruction in the more advanced methods and processes of weaving, and practical exercises in the same, as also higher instruction in the other branches of knowledge comprised in the first course.

Arrangements have been made with the neighbouring manufacturers, in accordance with which they provide the raw materials to be worked up in the school, and subsequently take the woven fabrics, paying for them at the usual rates of wages.

The Sunday school is open from 1 to 3 p.m., to all persons engaged in industry, without exception, be they masters, journeymen, or apprentices, and the pupils are divided into two classes, the instruction in the first being adapted to all trades in common, and consisting of lessons in free hand and linear drawing, in German composition, especially information on subjects relating to trade, and in mental and common arithmetic. The second class comprises the weavers alone, and imparts theoretical and practical instruction in their trade. These Sunday classes are as yet entirely gratuitous.

The resident scholars, who are divided into two classes (one for beginners, and another for persons who have already learnt weaving, but who wish to perfect themselves in the trade), and whose educational course extends over two years, pay annually, for board, lodging, and instruction, 150 florins, if natives of Bavaria, if not 200 florins, in addition to which the school receives their earnings.

Two salaried masters, and one pupil teacher, are attached to the school, the head-master acting at the same time as chief of the household.

Prospectus of the Industrial, Drawing, and Wood-carving School in Berchtesgaden.

This institution, being a district school, is under the direction of certain district authorities, whose services as school committee, &c. are not remunerated. As yet the school has but one master for drawing and wood-carving, who receives a salary of 600 florins (defrayed out of the district treasury, with some assistance from the funds of the circle), free house, &c., and is appointed by the Government. All other expenses of the school are also defrayed by the district, the industry of which it is intended to benefit, and pupils belonging to which receive instruction gratuitously. The school hours are from 7 to 11 a.m., for the first class, and for the second class from 7 to 11 a.m., and from 12 to 4 p.m. Pupils who are found deficient in elementary knowledge, such as reading, writing, and cyphering, receive instruction herein separately.

As a rule the pupils are expected to attend the school during four years, and when they leave they still remain in connexion with it, in so far that they have a special claim to the use of patterns and models belonging to the school, when they are not required by the actual pupils, and to exhibit for sale their works in the repository annexed to the institution, and in which the work of the pupils is sold for their own benefit and that of the master.

Annual Report of the Polytechnic Society's School in Würzburg, 1866-67.

The number of pupils attending the school during the year was—

In the elementary classes	554
„ free hand drawing class	164
„ modelling class	11
„ linear drawing classes	164
„ chemistry class	17
Total	910

In the higher technical school the number of pupils was 78.

Annual Report of the Commercial School and the Preparatory School connected with it in Nürnberg.

The number of scholars attending the school during the year was:

In the commercial school	280
„ preparatory school	270
	550

Appendix to Mr. Rumbold's Report (see page 117).

(Translation.)

SWITZERLAND.

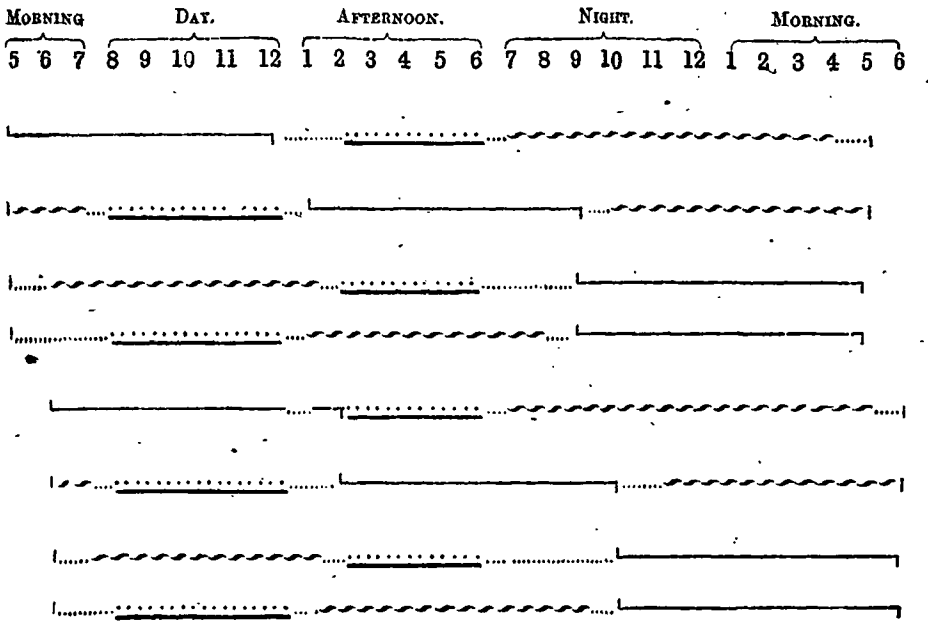
M. GUILLAUME DE GRAFFENRIED, a partner in the firm of Flenggeler and Graffenried, who have recently founded a large cotton-spinning establishment at Feldenau, near Berne, has kindly allowed me to take a copy of the table herewith annexed, showing several schemes for the employment of children in factories where work is carried on both by day and by night. The division of time is very ingeniously exemplified by this table, and it is worth remarking that, in each variation, care has been taken to allow for four hours' attendance at school.

M. de Graffenried has also furnished me with the following details respecting the Felsenau factory which, although not bearing on the subject of the foregoing report, I give as being of interest.

This establishmedt, in which a capital of two millions of francs (80,000*l.*) has been invested, is situated on land surrounded on three sides by one of the numerous bends of the River Aar. A tunnel, 3,000 feet in length, pierced through the side of a hill overhanging the meadow on which stand the buildings, starts from the upper bend of the river, whence it carries to the lower bend a volume of water measuring 500 cubic feet, per second, and moving at the rate of five feet per second. The fall of water from the entrance to the issue of the tunnel is 37 feet, and produces a force equal to 1,800 horse-power (only about 500 of which are at present employed), by means of which the entire machinery of the mill is set in motion. The buildings are on the one-storied principle, and up to the present time contain 22,000 spindles, making cotton yarns from No. 10 to No. 60 English. About 300 hands (men and women) are employed in the mill, and are most

of them lodged in cottages built by the millowners (*cité ouvrière*). consisting of more than 30 distinct lodgings of three or four rooms each. The work is at present carried on both by day and by night, one relay working from six o'clock in the morning to twelve, and from one o'clock to seven in the evening, and being relieved at the latter hour. One hour's complete rest is allowed in the day between twelve and one. It is the intention of the owners to increase their operations by the end of the present year, so as to work 55,000 spindles, producing cotton yarns ranging from No. 10 to No, 100 English. The buildings will be more than doubled, and the number of workmen proportionately increased. Even after completion of these additional works, spare water power to the extent of 1,200 horses will remain, and M. de Graffenried is very desirous to see other establishmants founded in this exceptionally favourable spot. A factory for rifles and small arms could hardly be better situated. It seems that a number of the "Engineer," published in the winter 1866–67 contained a very complete and accurate account of these works.

Scheme for regulating Labour of Factory Children at Felsenau, near Berne.



	Number of Hours				Remarks.
	Work.	School..	Uninterrupted Sleep.	Meals and Rest.	
I.	7	4	9	4	Sleep at night, and school after work.
II.	8	4	9	3	Sleep at night, and school before work.
III.	8	4	7	5	Sleep in day-time, school before work.
	8	4	7	5	Sleep in day-time, school after work.
I.	7	4	10	3	Sleep at night, school after work.
II.	8	4	8	4	Sleep at night, school before work.
III.	8	4	6	6	Sleep in day-time, school before work.
	8	4	8	4	Sleep in day-time, school after work.

Prussia.

Regulations for the Organization of the Royal Trade Academy (see page 21).

(Translation.)

§ 2. The conditions of admission are:—

a. The candidate must not be under 17 and not above 27 years of age, which must be proved by certificate of birth. Exceptions may be made in extraordinary cases.

b. He must prove that he has obtained a certificate of competency either from one of the provincial industrial schools authorized to issue such certificates from a commercial school (*Real schule*) or from a gymnasium. "

Foreigners, who fulfil the conditions mentioned under *a*, and who are in possession of sufficient preliminary knowledge, may be admitted, if there be room for them.

§ 3. The Royal Trade Academy is divided into:—

I. A general technical division.

II. A division for special technical branches, such as—

1. Mechanics.
2. Chemistry and metallurgy.
3. Naval architecture.

The scientific instruction imparted in the general technical division is entirely theoretical.

In the special divisions for chemistry and metallurgy, practical exercises in the laboratory are combined with the theoretical instruction.

The duration of the course in each division is one year and a half; the whole course consequently comprises three years.

Only those pupils are admitted to the lectures in the special division who have completed the course in the general division. Shipbuilders must moreover prove that they have for one year, at least, practised this trade as their principal occupation in some shipbuilding yard.

Chemists may exceptionally be granted the privilege by the director of the institution, to attend the lectures in the special division after only one year's attendance in the general division.

Mechanics may, if they choose, continue to work in the workshop for one year after the completion of the entire course.

§ 5. The course of instruction comprises the following subjects:—

I. In the general technical division:—

a. Supplement to general arithmetic, higher equations.
b. Spherical trigonometry and its applications.
c. Differential and integral calculus.
d. Analytical statics and dynamics.
e. Theory of the mechanical effects of heat.
f. Descriptive geometry and its application to perspective, the construction of shadows, and stone-cutting.
g. Special organic chemistry.
h. Physics.
i. General experimental chemistry.
k. General theory of architectural construction.
l. Theory of the simple parts of machinery.
m. Free-hand drawing.
n. Modelling.

II. In the special division:

1. For mechanicians:

a. Theory of the solidity (*Festigkeit*) of the parts of buildings and other constructions. theory of the arch, the buttress, and the lining of walls (*Futtermauer*).

b. Motion of water and air in natural and artificial conduits—applied hydraulics; the theory of furnace-building.

c. General theory of machines, their resistance, and their regulators, more especially of hydraulic motors and steam-engines.

d. Calculations relating to the simple parts of machines; general arrangement of machines.

e. Special theory of machines, power engines.

f. Mechanical technology.

g. Chemical technology.

h. Exercises in planning parts of machines.

i. Exercises in planning power-engines.

k. Exercises in planning entire machines and the establishment of factories.

l. Sketching and drawing artistic forms suitable for application to iron-work.

m. Mathematical proof of the most important physical laws.

2. For chemists and metallurgists:

a. Special inorganic chemistry.

b. Special organic chemistry.

c. Mineralogy.

d. Geology.

e. Metallurgical chemistry.

f. Chemical technology.

g. Theory of special machines, power engines.

h. Exercises in planning chemical works.

i. Practical work in the laboratory.

3. For shipbuilders:

a. to *i.* the same as under II, 1.

k. Designing of ships and parts of ships.

l. Naval architecture. General matters. Of deplacement and stability; first part, hydrostatic calculations.

m. Naval architecture, theory of stability, second part; theory of sailing-vessels and steam-vessels; general principles of the form of vessels; theory of construction of wooden and iron ships.

n. Exercises.

o. Designing and calculation of ships.

§ 6. A free choice of subjects within each division is allowed to the pupils. Any one who receives a stipend, or who enjoys a free place, is, however, bound to take part in all the lessons, unless the director determines that, in consideration of the extent of the student's previous knowledge, or of the special direction of his studies, he may be exempt from attendance at certain lectures.

§ 9. The honorarium for instruction amounts for each weekly lesson of an hour to $\frac{3}{4}$ thaler (2*s.* 3*d.*) per semester; and for chemists who desire to take part in the practical work in the laboratory to 25 thalers (3*l.* 15*s.*) per semester. This is to be paid in advance.

In the honorarium for the use of the laboratory is included the wear and tear of apparatus, &c., but only in as far as the injury sustained is not caused by carelessness.

§ 10. The vacations extend from the 15th of August to the 1st of

October every year, besides which ten holidays are given at Easter and Christmas respectively.

§ 11. The use of the collections of models in bronze and plaster of Paris serving to illustrate the instruction given, as also the use of the library, is allowed, under certain conditions.

§ 12. The mechanical workshops of the institution do not only serve for practical exercises, but are also meant to afford opportunities for the construction of new machinery and models to be used in industrial undertakings.

§ 13. Young men wishing to join only some special lectures of the trade gymnasium, may be allowed to do so on payment of a honorarium of 1 thaler (3*s.*) per semester, for each lesson in the week.

§ 14. In order to ensure a steady development of the trade academy, a council of studies is established, which is to deliberate on such changes in the organization of the institution as may seem desirable, and to submit its conclusions for approval to the Minister of Commerce, Industry, and Public Works.

This council consists

(*a.*) Of a superior official of the Ministry of Commerce, &c.;

(*b.*) Of the director of the academy as the substitute of the former;

(*c.*) Of two teachers in the institution;

(*d.*) Of two other men of science and of technical art.

Berlin, 23rd August, 1860.

Appendix to § 9.

By a resolution of 31st March, 1866, of the Minister of Commerce, &c. it is determined that from the beginning of the summer semester of 1866, participation in the practical work in the mechanical workshops is to be paid with one thaler per semester for one weekly lesson, and in the photographic atelier with 2 thalers.

The materials necessary for the work must be provided by the pupils.

OBSERVATIONS.

Each Government district (*Regierungs Bezirk*) furnishes a so-called State stipend of 200 thalers annually, and free instruction to be enjoyed by some pupil of the trade academy, and which is bestowed by the Minister of Commerce, &c.; but on such candidates only as have a certificate of distinguished merit from some provincial trade school, or who have a good certificate from a *real schule* or a gymnasium, and who are believed to possess considerable talent. Petitions for the stipend are to be addressed to the Government department concerned.

Free places in the institution are also accorded by the director to candidates who can prove their indigence by a certificate of the local authorities of their place of residence, which must contain full particulars as to the circumstances of the candidate, and attest that if not exempt from payment of fees he will be unable to attend the school.

There are various private foundations also in connection with the trade gymnasium, and in addition to the stipends furnished by these, each of the three governmental districts of Magdeburg, Erfurt, and Merseburg, accord an annual stipend of 200 thalers, with free instruction, to some indigent scholar belonging to a commune within the province of Saxony. These stipends are called stipends of the Provincial Estates of Saxony, by whom they are given away under the same conditions as the State stipends.

Commercial and Industrial School for grown-up Daughters in Berlin.

Under the Patronage of H.R.H. the Crown Princess of Prussia.

(*Founded and Conducted by Professor Clement.*)

This School, first established under the patronage of "The Association for the Promotion among Women of the capacity of gaining a livelihood," was opened on the 23rd April, 1866. Its object is to afford young women who possess sufficient preliminary knowledge, and consequently more especially young women belonging to the higher and middle classes, the means of systematic instruction, and practical exercise in such knowledge as shall enable them to fill suitable positions in commercial and industrial undertakings, and more particularly to make them efficient book-keepers, accountants, and correspondents.

The institution consists of two principal divisions, the course in division A extending over two years, and that in division B over one year.

Division A it destined for young ladies who wish to obtain as extensive a culture as possible, with a view to future employment in commerce or industry. (Age of admission 15.)

Division B is suited to ladies who wish to acquire, in as short a time as possible, the knowledge necessary to enable them to enter at once into some practical employment. (Age of admission not under 16.)

The plan of instruction temporarily established for the two divisions is as follows:—

Subjects of Instruction.	Hours in the Week.		
	A.		B.
	Year.		Course of 1 Year.
	I.	II.	
1. General knowledge of commerce and industry, definition of commerce, different kinds of trade, auxiliary means of trade, coinage, weights and measures, money, banking and exchange business. The most important laws relative to commerce and industry	1	2	2
2. Commercial and industrial bookkeeping (by single and double entry)	1	2	2
3. Commercial correspondence in German	—	1	—
4. Commercial handwriting and practice herein by writing themes in connexion with commercial business ..	3	—	3
5. General arithmetic, and calculations relative to commercial and industrial undertakings	4	2	4
6. Elements of natural history .. } As auxiliary to	2	2	2
7. Elements of physics and chemistry } Nos. 8 and 10	2	2	2
8. Knowledge of goods and technology	—	2	2
9. Commercial geography and commercial history (synopsis)	—	2	1
10. Knowledge of matters connected with the vocation of women, more particularly of domestic economy ..	—	1	—
11. German language and composition	2	1	3
12. English language and correspondence	3	3	2
13. French language and correspondence	3	3	3
14. Drawing, more particularly free hand and pattern drawing	3	3	3
15. Stenography (according to choice)	—	—	—
	24	24	28

Power is reserved to make such changes in the plan as experience may prove to be desirable.

In addition to instruction in the branches mentioned above, the following are considered as auxiliary means for rendering the institution efficient:—

a. A collection of books, specimens of goods, physical, chemical and technological apparatus, drawings, formularies, &c., &c.

b. Visits to technical workshops, manufactories, depôts of goods, &c.

The honorarium for instruction in division A is 50 thalers (7*l.* 10*s.*) a year; in division B, 60 thalers (9*l*), or, if English, French, and drawing be excluded, 50 thalers. In addition to this a fee of 3 thalers is paid on admission. Pupils are not received for a shorter period than a year. Hospitants, or pupils who only attend the lectures in particular branches, pay from 1½ to 2 thalers per semester for each subject of study.

The ladies who attend an entire school course, may, on leaving, and after submitting to examination in all the branches taught, receive a diploma.

Boarders pay, in addition to the school fees, from 200 to 250 thalers yearly.

The one branch of instruction in this institution which calls for special notice here, as being one for which no English school presents an equivalent, is that headed domestic economy, and which forms, as it were, the complement of the other scientific studies. It is a combination of the results of natural history, physics, chemistry, and technology, and the object of the course is to bring to bear upon housekeeping the knowledge obtained in those sciences, and to fill up whatever gaps may still be remaining as to the practical application of the studies.

The science of domestic economy embraces, according to the programme:—

I. The Knowledge of Sustentation.—Alimentary substances: the origin of the various kinds of food, the amount of nourishment contained in each, their digestive qualities, their distinctive qualities, the adulterations to which they are subjected, the tests that may be applied. Animal Food: butcher's meat, poultry, fish, oysters, eggs, milk, butter, and cheese. Vegetable Food: bread and flour stuffs, pulse, saccharine substances, garden vegetables, edible fruits, infusions, fermented drinks, salt, and spices. The most wholesome, most strengthening, and, at the same time, cheapest articles of food. The preparation of food and drinks. The object of cooking. The physico-chemical laboratory of woman—the kitchen:—Its local position and arrangements. The hearth and its arrangements. Fuel and fire. The cheapest materials for heating and lighting, Kitchen utensils, and the mode of treating them. Manner of testing them before purchase. Water. Hard and soft water. Rational boiling and roasting. Papin's pots. The most advantageous, and most speedy ways of preparing meats, pulse and other vegetables. The preparation of cold and hot drinks. Toasting and baking.

II. Preservation of Food.—Fermentation. Spirituous, vinous, and putrid fermentation. Causes of putrefaction, and means of preventing it. Hanging (drying), evaporation, reboiling, preservation in hermetically closed vessels, salting, smoking, pickling, preserving in sugar. The icehouse. Storing. Treatment of milk, making butter and cheese. The most advantageous methods of preserving.

III. Knowledge of alimentary stuffs, and of household goods and materials, in connexion with the instruction in the knowledge of com-

mercial goods, and taught by inspection of the specimens in the collection of the institution.

IV. Various domestic functions, such as care of the house-linen, &c., nursing of the sick, &c. Sanitary laws. Treatment and management of servants. Accounts.

The institution, which was opened on the 23rd April, 1866, began with 14 pupils, but the number was soon doubled. Several of the ladies have since obtained situations in accordance with their knowledge, and the number of pupils attending the school at the time of the last report, was 29 in the one course and 20 in the other.

Berlin Working Men's Association.

(*Sophien Strasse, No.* 15.)

This association, which was founded in 1843, by workmen and others, in Berlin, for the purpose of promoting, among the working classes, general culture, special professional knowledge, and moral conduct, now numbers 3,000 permanent members, nine-tenths of whom belong to the industrial classes, while as many as 10,000 temporary members have been inscribed during one year, and it is calculated that about 60,000 working men, from all parts of Germany, have, since the re-organization * of the society, seven years ago, been enrolled among its members.

The means by which this society seeks to promote its object, are: lectures, discussions, singing, gymnastics, a library, newspapers, and social amusements in which the wives and the children of the members take part.

Every young man above 17, whose good name is unquestioned, may become a member, on being introduced by a member, and on payment of 3 silver groschen (little more than 3*d.*) monthly.

The extent of the Society's activity having grown with each year, the necessity of a permanent abode was much felt, and a site was in consequence purchased, in 1864, at a cost of 24,000 thalers, and on this has since been raised a building costing 44,000 thalers, which is the first edifice in Germany devoted exclusively to the instruction of working men. Constructed according to a plan approved by the members of the society, the building offers every convenience for its different purposes. The central hall, 80 feet long, 60 feet wide, and 30 feet high, can contain more than 2,000 persons, and being in direct communication with a garden, it suffices, even on festive occasions, when it is open to the families of the members. Two stories are occupied entirely by lecture-rooms, &c., and the library.

The meetings take place four times a-week—on the week-days, in the evening, after working hours—and are occupied with study and debating, each one ending with singing exercises.

All subjects, with the exception of politics and religion, may be discussed. The debaters generally belong to the members of the Committee of Instruction, the subjects of debate being fixed and published three months in advance. In general, each debate forms a separate lesson, destined to solve some restricted question, but sometimes the same subject is carried through several debates. From 1861 to 1865, the annual reports of the institution name 592 such discussions, about the half of which treated of industrial questions and of subjects in natural science.

The Committee of Instruction, encouraged by the great desire to

* It was dissolved during the revolutionary period of 1848.

learn evinced by the working-men, have moreover proposed that the latter should lay before them all difficulties which they may encounter, and which may embarrass them in the course of their readings or in practical life, and a box kept for that purpose is every evening filled with questions on the most varied subjects, and emptied by the teachers at each successive general meeting.

The Committee of Instruction is composed of friends of industry and of the working-classes, who volunteer their services, and among them are numbered men who are the leaders in Berlin in various branches of activity.

In addition to the lectures and discussions, regular courses of lessons are opened for those among the members who wish to continue, or to improve their education. These courses are destined to fill up those gaps which are always left in the school education of the working-man, and which long years of labour necessarily tend to widen. The subjects taught are:—

	Weekly Hours.	Fee for 3 Months.
1. Caligraphy and reading	1	7½ groschen
2. Orthography and reading	1	10 „
3. German (grammar and reading)	2	10 „
4. German (syntax and reading)	1	7½ „
5. German (composition and epistolary style)	1	7½ „
6. Arithmetic—First course	2	10 „
7. „ Second course	1	7½ „
8. Linear and architectural drawing (Sunday morning) ..	1	15 „
9. Geometry	1	7½ „
10. Bookkeeping by single entry, theory of bills of exchange .. .. .. (Sunday morning) ..	1	1 thaler
11. Commercial Arithmetic .. (ditto) ..	1	1 „
12. Bookkeeping by double entry (ditto) ..	1	15 groschen
13. Mechanical designing .. (ditto) ..	1	1 thaler
14. Projection	1	7½ groschen
15. Singing in two courses .. .. each	1	7½ „
16. Stenography (Sundays)	1	1 thaler
17. Modelling	1	15 groschen
18. French language—2 courses	2	1½ thaler
19. English language „	2	1½ „
20. Pattern reading for weavers (Sunday)	1	15 groschen

The principle of demanding special payment for instruction was adopted after mature reflection. The contributions of the scholars go towards paying the masters, but do not entirely suffice for this, the Society having to make up from 400 to 500 thalers a-year.

Aspiring to give to the workmen not only that general culture which is required alike by all, but to render each specially qualified to carry out his particular calling, the society contemplates opening special classes for instruction, by competent masters, in the branches required for particular trades. As yet, however, only a school for the building trades has been established.

This school, under the direction of two architects belonging to the Committee of Instruction, imparts to young artizans connected with the building trades (*e. g.*, carpenters, masons, &c.), the theoretical knowledge required for the efficient exercise of their trades, and to enable them to pass the examination to become masters of their guild. The subjects taught are:—German language, arithmetic, theory of pro-

portions, algebra, geometry, theory of architecture, geometrical projection, elements of physics, theory of mechanical powers, theory of heat, agricultural architecture, ornamentation, architectural drawing, free-hand drawing, and modelling in clay.

The instruction is completed in four courses, each of which extends over four months of the winter, and comprises eight hours of instruction daily. The cost is, of course, proportionate to the time employed, and amounts to from 4 to 6 thalers monthly, payment for three months being made in advance. These courses have, from the commencement, been numerously attended. During the first winter (1864–65) the number of pupils was 68; during the second, 84; and during the third, 95. Among these latter were, 68 masons (35 journeymen and 33 apprentices); 25 carpenters (18 journeymen and 7 apprentices); 1 well-builder (journeyman); 1 coppersmith (journeyman);—44 of the number were above, and 51 under 20 years of age; 54 were from Berlin and the immediate neighbourhood, 33 from the provinces, and 8 from other German States; 32 had acquired their previous education in gymnasiums and practical (real) schools, 45 in elementary schools, and 18 in village schools. This difference in previous education, joined to the difference in natural capacity, is found to render the works of the teachers no easy matter, yet the report for 1867 speaks with pride of the results obtained.

The library of the Society, which is open gratuitously to all members, contains at present 3,500 volumes, the average number of readers being in summer 500, and in winter 700. The books exchanged during the two evenings in the week that the library is open, are calculated to amount to from 250 to 500 volumes. As for books treating of commerce and industry, though the library contains several copies of each, names are entered for them long before-hand, so great is the demand for them.

The reading-room, which contains 70 journals, besides political, technical, literary, and religious reviews, mostly the generous offerings of the editors, is very numerously attended.

The recreations offered and encouraged by the Society take place on Sundays and holidays in a large garden situated outside the town, or in the large hall of the Society. They consist of discussions, which on these occasions are adapted to the capacity of the wives and daughters of the members, who are associated in their pleasures; concerts, choral singing, and dramatic readings. On particular festivals, excursions into the country are arranged in summer, and, in winter, balls and scenic representations.

The Society has established for its members a savings-bank, in accordance with the system of Schulze-Delitzsch, and also an insurance company, affiliated to the great insurance company, the Germania.

Prussia.

Bill on Primary Instruction laid before the House of Lords in December, 1867.

(Translation.)

The Government has recently introduced in the House of Lords a new Bill on primary instruction. The importance of the subject, and the interest which the organization of the Prussian schools may have for France, induce us to give an analysis of this law, as well as of the statement of the reasons (*exposé des motifs*) which accompanies it.

The first organic law on the organization of primary instruction in Prussia is the statute relative to public schools, promulgated under Frederick II., 12th August, 1763. Later appeared the regulations concerning the Catholic schools in Silesia (1765 and 1801), and the general code of 1794.

During the period from 1806 to 1815, so important to Prussia, and which witnessed in succession the total destruction of the State, and its reconstruction, the basis on which primary instruction was then founded were entirely recast: A complete revolution was effected in the commune and in society at large, in the country as in the towns; the governmental and administration isolation of the provinces ceased; common ideas and common tendencies prevailed, and together with the obligatory military service, decreed at the same period, exercised a considerable influence on public instruction.

In consequence, at the time of the reorganization of the country in 1817, instructions were addressed to the civil and ecclesiastical authorities, in which it was said, that "in order to give to primary instruction a determined direction," a general plan of organization for the schools would be drawn up, and would serve as a basis for the special rules to be established for each province, and in which the interests of each locality should be, as far as possible, taken into account.

But it was not given to that epoch to solve the problem placed before it. The plan drawn up by the Commission nominated in November, 1817, and presided over by the Chancellor Hardenberg, and which terminated its labours in 1819, was found to be impracticable. With the exception of a few decrees of little importance, issued with respect to the Rhenish Provinces and New Pommerania, a period of legislative inactivity ensued, during which the administration, in endeavouring to develop and improve public instruction in accordance with the necessities of the times, was confined within the circle drawn by the existing laws and provincial regulations.

The Government was relieved from this state of inactivity by the Provincial Estates, which more particularly felt the insufficiency of the existing school regulations, and demanded their reform. Following the impulsion given, the Government, after long deliberation, refused a new set of regulations for the primary schools in the province of Prussia (Dec. 11 1843).

The guiding principle followed in drawing up these regulations, was, "to take for starting point the existing state of things, and not to depart from this except when circumstances and the ideas of the times exacted it," and in consequence only two innovations were introduced: 1st, the support of the schools was to be considered a duty of the commune, and no longer to depend exclusively on the patrons assigned to them; 2nd, a minimum salary for the teachers was to be fixed and generally adopted.

It next became necessary to frame similar regulations for the other provinces of the kingdom. Everything was ready prepared, and the scheme would have been discussed by the Provincial Estates in 1848, had not the serious events of that year intervened, and arrested the movement.

The Constitutions of December 5, 1848, and January 31, 1850, gave another direction to legislation, by announcing a general law on public instruction, the bases of which were determined before hand. This law was under preparation, all the teachers in the primary schools, and all the professors in the secondary schools in the kingdom were consulted. The Bill, framed under the auspices of the Minister Ludenberg, was communicated to the ecclesiastical authorities, but

was not deliberated upon, in consequence of its author withdrawing from the councils of the Crown.

From this time up to 1858 the idea of promulgating a law on public instruction was not lost sight of. But the steps already taken in this direction had made manifest the numerous difficulties which would have to be combated, and the Minister Von Raumer therefore turned his special attention towards the points which seemed more particularly to require reform, with a view to regulating them separately, whenever an opportunity should offer for doing so by administrative measures.

In 1859 Herr von Bethmann-Holweg took up again the abandoned idea, and caused a new Bill to be prepared, which, being based upon the Bill of Herr von Ladenberg, should regulate the whole of public instruction, with exception of the universities, but which, like its predecessor, failed to reach the Chamber of Deputies. However, attention remained fixed on the question, and the inquiries commenced, added every day to the arguments in favour of the idea that the realization of a general law was almost impossible, and that the end in view would be most speedily attained if the most important points were settled first.

Even the Chamber of Deputies, which up to that time had demanded that Art. XXVI of the Constitution should be strictly carried out, now proposed that the Government should bring in a Bill to regulate the external organization of the primary schools, and the salaries of the teachers. It started from the principle, as is shown by the report of the Commission, and by the debates, that such a law might, with perfect propriety, be voted, separately from, and previously to a general law, the realisation of which it would facilitate.

To the wish thus expressed by the national representatives is due the Bill which has just been introduced by the Government in the House of Lords. It deals only with primary instruction, and with those parts of its organization which demand legal enactment, that is to say, with the salaries of the teachers, and with the burdens imposed for the support of the schools and the teachers.

The Bill, which was already prepared last session, was not presented to the Chambers because of the annexation of new provinces. The Government wished to ascertain whether the Bill could be applied to these also in order that a matter of such great importance to the State might thus be based upon a general foundation apart from all mere local interests.

That the new enactments may remain in direct relations with the great whole of which they are destined to form a part, they have been preceded by certain general principles, the sole object of which is to consolidate the actual system of instruction, which has been consecrated by long practice.

The present Bill is divided into four chapters. The first (§ 1) treats of obligatory attendance at school, which is the basis of the entire system of primary instruction. The second (§§ 2 to 18) fixes the extent and the object of the instruction to be received, the rank of the public schools and the account to be taken in their internal organization, of local circumstances, of the conditions of population and of religion. The third (§§ 19 to 40) relates to the maintenance of the school establishments. The fourth and last (§§ 4 to 42) contains some final regulations.

1st.—*Obligatory Instruction.*

The prescriptions concerning the foundation and support of popular schools are based upon the obligation which rests upon every child

throughout the present extent of the kingdom, to follow the courses of a public school during a certain number of years, unless other means be provided for its education.

According to Article 21 of the Constitution, the limits of the instruction to be given had first of all to be defined.

Article I of the Bill therefore runs as follows:—

"Every child shall, from its 6th to its 14 year, be regularly instructed "in religion and in other knowledge necessary for civil life.

"This instruction shall be given in the primary public schools, "parents, guardians, and employers are bound to see that their children, "wards, and servants, attend school regularly, unless other means be "provided for their education. In the latter case the parties concerned "must be able to prove, whenever called upon by the school authorities "so to do, that the results obtained by the private instruction given, "correspond to those which the public instruction is expected to "produce."

According to the common law the children are bound to attend school from the completion of their fifth year. But as a general rule this is too early. At this age, in the country more especially, the physical and moral development of the child is not sufficiently advanced to render it likely that regular instruction would be attended with much success. For this reason the German school regulations of the 17th century took as their starting point the completion of the sixth year, which was adopted by the decree of 1845 also, and which is recommended by the various governments.

The common law decides that the child may leave school when the persons charged with its education "consider that it has acquired the knowledge necessary for ordinary members of the class to which it belongs." In practice this age is that of confirmation, which takes place when the 14th year is completed, and this has been adopted by the present Bill.

2nd.—*Organization of the Public Schools.*

(*Elementary Schools and Burgher Schools.*)

Under the name of popular public schools are comprised all the establishments intended to impart the instruction ordered by the law, whether this instruction be limited to the minimum, or be extended to the maximum. These establishments may consequently be divided into two classes; those in which the instruction given stops at the minimum, and those which bear the name middle, or burgher schools, and in which more extended instruction is given than is absolutely demanded of the elementary schools.

The Bill adopts this division, which already exists, and, by giving it a base and a terminology, satisfies a want often felt. It must, however, be remarked that in the old laws and in the Constitution, only the schools which we here designate as elementary schools, are comprised in the term popular schools, and that up to the present moment the regulations relating to them could not quite properly be applied to the establishments of a higher grade which are now termed burgher schools. In deciding that this shall be done in future, the Bill in a measure introduces an innovation, but in the regular course of progression.

The popular schools must indeed, if they are to answer to the requirements of the times, transform themselves in nearly all the large cities into burgher schools, without, however, being confounded with the

higher burgher schools, with the schools of the second grade, or with the commercial schools, called *real schule*, which rest upon a different foundation, and have a different object. Whether it belong to the first or the second grade, whether the instruction given be more or less extended, the elementary school is identical with the popular school.

§ 2 of the law runs thus:—

"The plan of studies in the elementary schools comprises:

"1°. The rudiments of religion and Bible history; 2°. Reading, writing, German recitation; exercises in spelling; in the localities where German is not the native language, this circumstance must be taken into account in the schools; 3°. Explanations of history, geography, and natural history rendered necessary by the reading book; 4°. Elementary exercises in calculations, measurement, and drawing; 5°. Singing.

"In addition, the boys are to receive the first lessons in gymnastics, and the girls, when possible, are to be taught needlework."

It will be seen by this that the instruction is limited to the strictly necessary. The prevailing ideas on education required the introduction of gymnastics in the plan of the lessons. As for the lessons in needlework, however desirable they be, it will not be possible to introduce them generally. Upon the whole it has been necessary to take into account local circumstances, and the insurmountable difficulties which have previously been encountered when endeavours have been made to organize this system of instruction.

The 3° § determines that in all schools, in which the establishing of several classes is deemed necessary, one of the masters is to have the direction. By this means the unity of instruction and organization is secured.

§ 4 calls for the establishment, wherever existing means will admit of it, of burgher schools, in which the plan of studies of the popular schools, being extended and distributed through graduated classes, shall comprise as special subjects of study—German history, geography, and natural history. The instruction in drawing, arithmetic, and geometry, given in these schools, must have particular reference to industry, and a course of modern languages may be introduced. These schools shall be under the direction of a rector (head-master).

In order that the necessities of the province and of the locality may be taken as much as possible into account, the limits of the instruction to be given in the burgher schools have not been very strictly defined. The sole direction of a rector is even more beneficial to the school than is that of the directing master in the primary school.

§ 5. Attempts have been made in various countries to comprehend, in the organization of public instruction, the establishments destined to educate children who have not yet attained the age at which, according to law, they are bound to attend the elementary schools. The present law gives up those establishments to private enterprize, though expressing a wish to see them connected with the general system.

Articles 6 to 11 may be summed up in the following regulations:—

Such of the elementary schools as have a special religious character shall retain it. The minister may, however, deprive them of the privileges of a public school, if it be proved that they have, during three consecutive years, comprised no more than twenty pupils.

The masters of elementary schools, with one class only, and not being of a religious character, shall belong to the religion of the majority of the children. If the school comprise several classes, the

master may belong to any one of the dominant confessions of the district.

The popular schools to be created in future are to be either Protestant-evangelical, or Catholic. Wherever the number of Jewish children be sufficient, Jewish schools may be established.

Admission into the schools is independent of religious profession.

Scholars of a different faith to that of the master shall not be bound to attend his religious instruction, contrary to the wishes of his parents or guardians. When these scholars have passed their fifteenth year, care should be taken that they be placed under the religious instruction of some minister, in the neighbourhood, of their own faith.

It is pointed out generally in these articles that religious instruction is, in the elementary schools, the basis of all other instruction; that it must be given conformably with the principles of the recognized confessions; and that each school must, in consequence, bear a religious stamp. This is a rule which, in all times, has been applied to the schools of Germany, which is maintained by Art. 24 of the Constitution, and relative to which the Royal Decree of 1821 only made some exceptions.

Art. 12 entrusts to the Provincial Governments the task of watching over the due attendance at school by the children during the prescribed time.

As illness, feebleness of constitution, the distance from the school, the state of the roads, or of the temperature, may influence this attendance, only a general rule has been laid down, viz., that which determines that attendance at school shall be extended until the end of the semester in the case of children who attain their fourteenth year before the course is ended.

A certificate to be delivered to each child on leaving the elementary school will, it is thought, be useful to the child in its future career.

The number of lessons per week must not exceed 30, and not be less than 26. The Government alone has the right to change this number should circumstances require it.

The results obtained by the master, and the progress of the pupils, often depend upon the number of the latter. In order that the work of the master may not exceed his capacity, it has been decided that each class shall not contain more than 80 pupils, and that in the communes, where the number amounts to from 80 to 120, the master shall be authorized to form them into two divisions, and to instruct them at different times (three hours daily each). The poverty of the communes may sometimes be opposed to having two masters.

When a child of twelve years of age, who has acquired a knowledge of reading, writing, cyphering, and religion, in conformity with his age, finds the means of entering into service, are engaging in work, he may be exempt from attendance at school during part of the time prescribed, but on condition of his attending another school, if not his own, at least three hours a-day. This regulation settles a question which has often been raised, and accords in principle with the law of 16th May, 1853, and with the Royal Decrees of 6th April, 1839, and of 22nd September, 1867.

Art. 17 of the law runs thus:—

"Parents or guardians who neglect to send the children entrusted to their care to school in accordance with the law, may by legal measures be compelled to do so. These measures shall consist, first, in a fine of 10 silver groschen (about 10*d.*) or less for each day's absence, or imprisonment for a term commensurate with the fine; second, by the

children being taken by force to school, and a certain fine being levied for the benefit of the Government.

The regulation of details relative to this article is left to the different provincial governments. The article itself is based on the civil law, which says (§ 3, Art. 12, part II.) that the school inspectors are authorized to force the children to follow the course of instruction, and to impose a fine on parents who neglect to fulfil the obligation enjoined by the civil law.

According to this law, the penalties inflicted were not of a correctional nature, and the fines imposed were paid into the school treasury which bore the burden of the judicial proceedings. Though much contested, this rule has prevailed up to the present moment, in consequence of the police having refused to interfere, and of the Government having given repeated instructions on the subject. But recent judgments by the tribunals have rendered its value doubtful, and there was a call for a decision either in its favour or against it. The present Bill adopts the old interpretation and the old principles.

It has been considered advisable to avoid rigorous measures and judicial proceedings, and to depend rather on the employment of the means strictly necessary to insure the children's attending school.

In such matters various considerations have to be taken into account, and of this judicial proceedings do not admit.

Article 18 lays down that the foundation and organization of the new schools, the modification to be introduced into the old ones, or their entire suppression, the limits of the subdivision of schools, and the distribution of the children among the different establishments, shall depend upon the provincial governments, which shall give their decisions after having heard all parties concerned, and after due consideration of their wants and their means.

III.—*Maintenance of the Elementary Schools.*

Art. 25 of the Constitution provides that the expense of founding and extending elementary schools shall be borne by the communes, and, in case of proved incapacity of the latter, by the State, in as far as a certain contribution towards the sum required.

The present Bill maintains this principle, and Art. 20 defines the cases in which the new regulations ought to be applied.

This application is to be made on the following bases:—1st. The existing schools are to retain possession of their revenues; 2nd. The sums necessary to complete their maintenance may be provided by the school community (*la circonscription scolaire*); 3rd. The communes and independent property shall bear a share of the payment.

The funds to cover the expenditure caused by the elementary schools are to be levied at the same time as the other communal taxes.

Arts. 23 to 29 determine the manner in which the expenses of the school shall be assessed among the various parties bound to support them.

Schools supported by private contributions may be recognized as public schools if they fulfil the conditions of these latter. In this case the private endowed schools will enjoy the same rights, and render themselves liable to the same duties. The rules of the assessment of expenses will not, however, be applicable to them.

The Administration may proceed, but with reservation of acquired rights, to reconstruct the school districts (*les circonscriptions scolaires*). In case of disagreement between the parties concerned, the decision will devolve upon the Minister of Public Instruction.

Teachers in elementary schools in towns of 10,000 inhabitants or less, are to receive free house and a minimum of from 200 to 250 thalers (30*l.* to 37*l.* 10*s.*). The rectors of the burgher schools are to have free house and a minimum salary of from 400 to 600 thalers (60*l.* to 90*l.*).

The masters of the village schools have; 1°, a right to a free house, and fuel for house and kitchen use; 2°, to certain lands, to provisions, and to money in the quantity required for their comfortable subsistence. The provincial estates are to determine the bases according to which lands, provisions, and money are to be granted.

If the teacher have functions to fulfil, in connection with the church,* the remuneration for these is to be added to the school salary when calculating the minimum.

The school district is bound to place at the disposal of the new schoolmaster vehicles to convey his family and furniture within a distance of ten leagues, or, in lieu of this, an indemnity of 20 thalers.

The family of a deceased schoolmaster have a right to inhabit the school-house during the first three months after his death, and to receive the usual income during the same period.

The school district must bear the burden of the supplementary pay for the teachers (*frais de suppléance des instituteurs*).

IV. *Special Regulations.*

Appeal against the ordinances of the local government may be made within a month after the date of promulgation. The appeal is to be addressed to the Minister of Public Instruction.

All laws and ordinances, as well as all decrees and regulations anterieur to the new law, are to be abolished, in as far as their provisions are contrary to those contained in the law.

Such is the summary of the bill which has recently been introduced into the House of Lords by Herr von Mühler, Minister of Public Instruction in Prussia.

Programmes of the Royal Superior Industrial School, the Architectural School, and the Workmaster School, in Chemnitz.

(Translation.)

The systematically organized instruction and suitable exercises in the Superior Industrial School offers to students who desire to devote themselves to mechanical or chemical technics, or to agricultural pursuits, the means of attaining the scientific knowledge required for their purpose, while those whose object is to become teachers of mathematics, the physical sciences, or technics, or who wish to prepare themselves for various industrial branches (such as the building trades, mining, smithing, &c.), which are not specially represented in the school, may here acquire the preliminary knowledge necessary to qualify them for admission into a higher educational institution, or into a school for the special branch of art or science which they have selected.

The superior industrial school is divided into four classes, the course of studies in each extending over one year. These classes are

* The schoolmasters in Germany very frequently officiate as parish clerks.

arranged, according to the nature of the studies, under three heads, designated by A, B, and C.

The division A comprises those students who intend to devote themselves to some branch of industry in which complex machinery is employed, and who desire to acquire the full amount of knowledge which the institution imparts. These scholars go through all the four classes of the school, and are again subdivided into two divisions, A*a* and B*b*, the subdivision A*a* comprising those who intend to devote themselves to some branch of technics, as, for instance, the construction of machinery, spinning factories, &c., or mechanical pursuits specially; while in subdivision Bb are comprised those scholars who wish to devote themselves to some one branch of chemical technics, as, for instance, cotton printing, the manufacture of sugar, &c., or to chemical pursuits specially.

Division B includes the scholars who have selected a branch of industry more especially connected with chemistry, but not requiring complicated machinery for its execution, or who wish to prepare themselves merely for the chemical work of some business, and who do not, therefore, require to take part in the instruction in mechanics and mechanical engineering, or in the highest instruction in chemistry—persons, for instance, who wish to become soap-boilers, dyers, colour-mixers, &c. These scholars only attend the three lower classes, and therefore complete their course of instruction in three years.

Division C comprises the scholars who desire to devote themselves exclusively to agriculture and farming. These, also, complete the course in three years.

Instruction in the auxiliary sciences, language, &c., is given to the scholars of the different divisions in common, while the lessons in such branches as bear only on some special pursuit, are given separately to the scholars of the division concerned.

The plan of studies is as follows:—

FOURTH CLASS.—(*In two parallel divisions, IV a and IV b.*)

a. In common for all scholars belonging to the class:—

1. Arithmetic (6 hours weekly). First, special arithmetic: the formation of numbers, systems of numbers, calculations with unknown quantities (use of brackets—calculation with whole and fractional numbers. Geometrical proportions.) Calculation with known quantities. First four rules of arithmetic, Reductions. Application of geometrical proportions. Calculation of interest and percentage. Rule of three, double rule of three, arithmetical propression. Calculations with moneys. Next, general arithmetic: The four fundamental operations in algebra. Raising and diminishing the powers, simple expressions. Squaring and cubing composite expressions. Evolution of the square and cubic roots of polynomics and numbers. Finding of factors. Solving algebraic fractions. Calculations with algebraical fractions. Mixed reductions. Equations of the first degree with one unknown quantity. Solution of problems in which these equations are used.—2. Geometry (4 hours). Lines and angles, in the congruity of the triangle; in squares and polygones, chords, secants, and tangents of the circle, two circles, angles in circles, regular polygones, similarity of triangles, lines in triangles, similarity of polygones, lines in and of the circle. Determination of the circumference of regular polygones and of the circle. Theorems of equality and of the proportions of areas, of the determination of the contents of figures.—3. Physics (6 hours weekly in summer, 4 in winter). General properties of bodies; the most important points

relating to the specific gravity of bodies; heat; meteorology; electricity; magnetism.—4. Free-hand drawing (6 hours) from geometrical bodies, models in plaster, &c.—5. Geometrical drawing (4 hours). Construction of plane figures by way of preliminary exercises for the theory of projections and mechanical drawing. Exercises with Indian ink.—6. German language (4 hours). In Class IV b. in which pupils are often admitted whose spelling is still deficient, 2 hours a week are devoted to exercises in orthography and composition, while 1 hour is given to recitation, and 1 to grammar. In Class IV a, in which the pupils have generally a greater amount of preliminary knowledge, 2 hours are given to grammar, 1 hour to exercises in verbal expression, and 1 hour to written exercises.

b. For Division C.

7. Natural history (4 hours). In the summer semester, general and special botany, with particular reference to plants important for practical use, and encouragement in the examination and classification of living plants; in the winter semester, general zoology, with special reference to the anatomy and physiology of mammalia.

THIRD CLASS.

a. For all the pupils of the class in common:—

8. General chemistry (8 hours). Inorganic chemistry; fundamental principles of chemistry; explanation of the individual elementary bodies and the more important combinations into which they enter, and with constant but slight reference to their practical uses, in every case illustrated by suitable experiments, and by exhibition of the chemicals in question. Organic chemistry: elementary analysis of organic bodies; explanation of the most important vegetable and animal substances (vegetable fibres, starch, sugar, organic acids and bases, fats, oils, resin, dyes, bones, flesh, blood, milk, &c., &c.), and the products of their decomposition (products of fermentation, of dry distillation, &c., &c.), with reference to their properties, the mode of obtaining them, and their uses.—9. German language (4 hours).

b. For Division A.

10. Arithmetic (4 hours). Equations of the first degree with several unkown quantities, diophantic problems; equations of the second degree; powers; logarithms; logarithmical equations; arithmetical and geometrical progression; calculation of compound interest. —11. Geometry (4 hours). Stereometry; plane trigonometry; application of algebra to geometry.— 12. Physics (four hours). The mechanical principles involved in physics, with reference to solid, fluid, and gaseous bodies; acoustics; optics. The physical propositions should, in as far as the knowledge of the pupils will allow of it, be mathematically proved, and elucidated by the solution of problems.— 13. Descriptive geometry (theory of projection) (six hours, for A*b* in the summer half-year only). Rectangular parallel projection in its application to plane surfaced solids; representation of the point, the straight line, and of plane figures and their parts, with problems for practice; determination of real quantities from projections, and of real projections from given data; the triangle, solid rectangles and their mutual relations; intersections, representation of conic and cylindrical surfaces; construction of conic sections; intersection of conic surfaces; development of the same; representation of curved surfaces, their intersection by and contact with plane and spherical surfaces.—

14. Free-hand drawing (four hours in summer), as in Class IV, but with gradual transition to further elaboration of the drawing, with due distribution of light and shade.— 15. Exercises in Indian ink (two hours in winter only for division A*a*). For these exercises, lithographed plates with representations of the outlines of geometrical figures and parts of machinery are used.—16. Commercial arithmetic (2 hours in the winter half-year). Calculation of discount on goods and allowance to agents; calculations of interest and discount; simple calculation of exchanges and discount of bills. Calculation of interest in different currencies. Calculation of State bonds and shares. Goods accounts (invoices and accounts).

The subdivision A*b* takes part, besides during the winter half-year in the practical chemical works (No. 18)-

c. For Division B.

17. Mechanical technology (2 hours). Second part of the two years' course, which comprises the mode of extracting and of smelting ores, of preparing wood, and of preparing fibrous plants for spinning and weaving as the chief subjects of instruction.— 18. Practical chemical work in the laboratory (from 8 to 12 hours in the week during the winter half-year). Practice in the execution of chemical operations in general; description and examination of the materials most important to industry; exercises in analytical chemistry. The operations for executing which the institution provides the materials and the apparatus, are selected for each pupil according to his knowledge of chemistry and with reference to his future vocation. The scholars keep a written account of the work done. In addition to this work, division B takes part in the lessons in arithmetic, geometry, physics, free-hand drawing, and commercial calculations (Nos. 10, 11, 12, 14, and 16).

d. For Division C.

19. Arithmetic (2 hours). Equations of the first degree with several unkown quantities; equations of the second degree; logarithms; arithmetical and geometrical progression; calculation of compound interest.—20. Geometry (2 hours). Plane trigonometry; stereometry.—21. Physics (2 hours). Theory of the equilibrium and motion of solid, fluid, and gaseous bodies; acoustics; optics.—22. Botany (4 hours in summer). Special botany, with particular reference to the wild plants that are injurious or useful to the agriculturist; exercises in the classification of plants; botanical excursions.—23. Zoology (2 hours in winter). Special zoology, with particular reference to the animals that are useful or injurious to farmers.—24. Mineralogy (4 hours in winter). Short survey of crystallography; consideration of the physical and chemical properties of minerals in general; physiography of the various species of minerals, with special reference to those which form important parts of arable soil.—25. Theory of machinery and technology (4 hours in winter). Description of the most important parts of machines and motors, as also of the working of iron and wood.—26. Mechanical designing (4 hours in summer, 2 hours in winter). Short explanation of parallel-projection. Delineation of agricultural implements and machines.—27. Practical geometry. In the summer half-year, practical exercises one afternoon every week, which are carried on by divisions of from five to six pupils at a time, with the use of the apparatus belonging to the institution, and the object of which is to solve the elementary problems of surveying (marking and measuring lines and angles, taking surveys of individual

points or entire figures, levelling lines and surfaces, &c.).—28. Commercial calculations (the same as under C.).—29. Bookkeeping and correspondence (in summer 2 hours, in winter 4 hours). Bookkeeping, theoretical part. Explanation of the idea and the object of book-keeping. Explanation of the various methods of book-keeping. The ledger, the day-book, and other books—their object, arrangement, and use. Practical part: incidents of business in moderate agricultural undertakings, comprising side branches, such as a distillery, tile works, &c. During a period of one year, and with bookkeeping by double entry. Correspondence on the various subjects that are likely to occur in connection with rural economy. In addition to this, the division C takes part during the winter semester in the lessons in botanical drawing (No. 38).

SECOND CLASS.

a. In common for all pupils belonging to the class.

30. German language and history of literature (4 hours), 2 hours in German literary history, one hour's practice in recitation and verbal and written criticism of what has been acquired, also taking minutes, and one hour of popular logic and rhetoric.

b. For Division A.

31. Analysis (4 hours for A *b* during the summer half year only). Known quantities; higher arithmetical progression; equations of the third degree; theory of combination; determination of relative values and quadrature of the functions; binomial, exponential, logarithmical, goniometric, and cyclometrical series; Taylor's series; determination of the value per cent. highest and lowest value of the functions. Method of the minimum squares.—32. Spherical trigonometry and analytical plane geometry (in summer 2 hours, in winter 4 hours weekly, for A *a* exclusively). 33. Mechanics (in summer 4 hours, in winter 6). The theory of the equilibrium and the motion of solid, fluid, and gaseous bodies, in as far as is required for the theory of machinery.—34. Exercises with Indian ink (2 hours in summer for A *a* exclusively). The same plates are used as in Class III, besides which the pupils elaborate delineations of machinery designed by themselves.—35. Mechanical designing (for A *a* 4 hours, for A *b* in summer 4 hours, in winter 2 hours). Mechanical geometrical constructions. Designing of parts of machines, and of simple motor and working machines from models, from sketches with dimensions marked, or from drawings.—36. Descriptive geometry (theory of projection, in summer 4, in winter 2 hours) for A *a* exclusively. Alterations in the planes of projection and the axonometrical projection. Inclined surfaces (*Windschiefen Regelflachen*) their simplest and most complicated applications. The construction of shadows, particularly for lighting by parallel rays of light. Central projection and its most important applications. Concise survey of the various methods of projection.—37. Practical geometry; and 38, Plan drawing (in summer one afternoon every week practical exercises in surveying, in winter 2 hours weekly. Plan drawing for A *a* exclusively). Surveying with chain and table, and prismatic compass, levelling, reduction, computation, and division of the measurements, barometrical measurement of heights. The exercises are gone through by 4 or 5 pupils at a time using the instruments belonging to the institution, and consist principally in the survey of pieces of land of moderate dimensions, together with levellings for the purpose of representing profiles, &c., &c. The plan drawing comprises principally graphic delineations of lands with reference to the surface

features and to their adaption for culture. In addition to the above the division A takes part in the lessons in mechanical technology (No. 17), and the subdivision A *b* in the lessons in mineralogy and geology (No. 41). Further the subdivision A *a* takes part 2 hours a week in summer, and 4 hours a week in winter, and the subdivision A *b* 4 hours a week in summer, and 6 hours a week in winter, in the instruction in technical chemistry (No. 39). During the lessons in which the pupils of the subdivision A *a* participate, a recapitulation takes place, but with some extension, of the previous consideration of the most practically useful chemical elements and combinations, with reference to their occurrence, their principal properties and reactions, their uses, and the modes of obtaining them; in addition to this these lessons treat of various fuels, of the system of lighting, of the fabrication of glass and of earthenware goods from the technica-chemical point of view. Subdivision A *b*, moreover, takes part in the practical chemical work (No. 40) during 8 or 12 hours a week.

c. For Division B.

39. Technical chemistry (6 hours). The whole range of chemistry is gone through anew, special pains being taken to extend and to confirm the chemical knowledge and the chemical judgment of the scholars in all directions; at the same time those matters which are practically most useful are specially dwelt upon, and a description is made of the most important chemical manufactures, and of the trades into which chemical processes enter largely, these trades being referred to in connexion with the lessons concerning the substances used in them, as for instance soap-boiling, in connection with the fatty substances, dying works, and printing works in connection with colouring stuffs, &c., the principal goods and products (fuels, colours, alimentary substances, &c.,) being also touched upon in these lessons in their proper places.—40. Practical chemical work in the laboratory (12 to 16 hours) the same as in Class III, but with special selection of work for each scholar according to his future vocation.—41. Mineralogy and geology (2 hours). In summer, mineralogy; elements of mineralogy; the physiology and terminology of minerals; physiography of the mineral species according to Naumann's system. In winter geognosy: Elements of physical geography and of geology. The knowledge of stones, rocks and gems (*Gesteinlehre*), more especially of such as are important to industry. The scholars belonging to this division further take part in the instruction in mechanical technology (No. 17) and if they with it in the lessons in mechanical designing (No. 35).

d. For Division C.

42. The physiology of plants (4 hours). In summer: I. Anatomy of cultivated plants; illustrated by microscopical demonstration and by drawings. II. General physiology of cultivated plants; theory of the nourishment of plants by selection and assimilation from the earth and from the air; principles of manuring; objects of the working of the soil; irrigation; draining; exposure to the air. Propagation of plants; fructification; inoculation; the production of varieties; improvement of seeds; individual propagation by budding. History of physiological development; germination, growth, maturity. Practical exercises. In winter. III. Special physiology of cultivated plants. Systematic description of the most important plants cultivated, and of the modes of culture applied to them. 43. Animal physiology. In summer (2 hours). I. Anatomy of domestic mammalia. The skeleton; the most important muscles and ligatures; the intestines; the blood ves-

sels; the nerves; the organs of sense. In the winter half year (4 hours). II. General physiology of domestic mammalia. The theory of alimentation. Assimilation. The four groups of alimentary substances. General principles of feeding. Experiments in feeding. The plastic process (production of flesh, fat, hide, and hair or wool); milk secretion; working power and breeding considered physiologically. Propagation: development of the embryo; inheritable qualities; object of crossing breeds. As supplementary instruction: the functions of the nerves; specific energy of the nerves of sense; action of the muscles. III. Special animal physiology. Explanation of the specific qualities of the different domestic animals. The production of flesh, fat, milk, wool, muscular power from the point of view of practical feeding. The hoof of the horse. The principal diseases which domestic animals are subject to. Practical exercises.—44. Rural economy (4 hours). Rural economy in its connection with political economy. (Fundamental principles, theory of capital and labour, of the circulation of goods, of money, credit, and price of the individual branches of revenue and their mutual connexion, of the consumption of materials and the relation of this to production. Knowledge required for carrying on farming business; the estate, its character and composition, its selection and acquisition; capital invested in the farm; buildings; implements; stock of cattle; manures; stores; agricultural work. Lesson in the arrangement and conduct of a farm in its various branches; in cultivation; in cattle breeding (particularly the selection of stock, and the methods of breeding and tending of cattle), and subsidiary branches of rural economy. Lessons in calculation connected with rural economy (valuations, estimates, and bookkeeping).—45. Rural architecture (2 hours). Short sketch of the theory of building materials; fabrication of tiles and drain pipes; lime kilns; various methods of preparing mortar. Examination of the various parts of a building, such as the walls and their foundations and openings, the floor, the ceiling, the position of the beams, the roof, &c., as also of the principal finishing works. Delineation of some important structures. Rules for the arrangement of dwelling-house, barns, and stables on a farm. Comparison of different simple plans for buildings of the kind, and estimates for the same according to the different modes of construction. The most important furnaces, hearths, and heating apparatus occurring in connection with rural economy.—46. Practical geometry. (In summer one afternoon every week). Practical exercises of the same kind as those in the Third Class, but carried on more independently, and intended to complete the instruction received in that class. The exercises consist mostly in measurements of more extensive agricultural lands, and in the execution of the levelling connected with these, for the representation of profiles and horizontal curves. With these exercises are combined, in the winter half-year, lectures on practical geometry (two hours weekly), which treat of higher branches of surveying, and of more elaborate surveying instruments than those used for the practical lessons, the subjects being treated more or less comprehensively according to the requirements of the pupils present.—47. Geognosy (two hours in summer). Mineralogy: description of the various rock formations, their structure, and position. Short sketch of the theory of formation and of petrifaction. Knowledge of soils. Geological excursions.—48. Agricultural chemistry (in summer 4, in winter 2 hours). Repetition of, and extended lessons in, those parts of organic and of inorganic chemistry which are most important to the husbandman, with special consideration of the principal constituents of soils and manures, and of animal and vegetable bodies. In addition, the scholars belonging to

his division take part (in summer 4 hours, in winter 8) in the practical chemical operations, occupying themselves more especially in the examination of soils, of manures, of the plants most important to agriculture, &c. They also take part in the instruction in technical chemistry (No. 3), (2 hours in summer, 4 hours in winter), given to the pupils of subdivision A*a*., special lessons also being given to them in the trades (such as the manufacture of starch and sugar, beer brewing, the distillation of spirits, the manufacture of vinegar, &c.) more especially connected with agriculture.

FIRST CLASS.

For Division A, which alone constitutes this class.

49. Theory of machinery (8 hours). On machinery and the construction of machinery in general; parts of machines for supporting, communicating, altering, and regulating motion, with special reference to manufacturing machinery; on the measurement of the motive powers and their effects; machines set in motion by the motive power of men, animals, water, and steam; the most usual working machines. —50. Mechanical designing (12 hours for A *a*., 4 hours for A *b*.). Designs of parts of machines and of simple machines.—51. Mathematics (in summer 4 hours, in winter 2 hours, for A *a*. exclusively). Theory of the higher equations; analytical solid geometry; mathematical problems. Mineralogy and geology (No. 41) for A *a*. exclusively. Technical chemistry (No. 39), the scholars still take part in these lessons, 2 hours weekly during the summer half year, these hours being specially devoted to instruction in the modes of obtaining the heavier ores.—52. Analytical and theoretical chemistry (in summer 2 hours, in winter 4 hours, for A *b*. exclusively). During these lessons the instruction previously received in qualitative analysis is repeated and completed, and quantitative analysis of weight and volumetric analysis is treated more thoroughly. Through this the pupils are further introduced into the sphere of pure theoretical chemistry. Practical chemical work (No. 40), for the scholars belonging to subdivision A *b* (12 to 16 hours weekly).—53. General architecture (2 hours for A *b*, if they wish). Elaboration, form, and mass of the principal building materials; the most important points relative to the manufacture of tiles and bricks; preparation of mortars. Structure of buildings in general with reference to the conditions of solidity, suitableness, and beauty. Consideration of the several parts of buildings with reference to their statical relations, according to architectural ratio, and combined with delineations of the most important constructions for given purposes. The most important points relating to the finishing work. Construction of flues. Combination of various small plans, and estimates for these. Mechanical technology (No. 17). The pupils of the first class take part in the instruction (4 hours weekly in winter) in matters relating to spinning and weaving given in the workmaster school, if knowledge herein be important for their future calling.

The pupils of the superior industrial school have moreover an opportunity of taking part in the instructon given in the following branches:—

54–58. The French language. The instruction herein is divided into 5 classes, with 3 hours weekly each. Pupils are admitted into the class for which their previous knowledge qualifies them.—59–62. The English language, the instruction in which is divided into 4 classes, with 3 hours weekly each, and into which pupils are admitted on the same conditions. 63. Bookkeeping and correspondence (in summer 4

hours, in winter 2 hours) for sub-divisions A. and B. of the second class.

In addition to this instruction is given in the fourth class 4 hours weekly.—64. In geography and history, and all pupils whose knowledge of these subjects is not considered satisfactory, are bound to join the lessons.

In the plan of studies of the superior industrial school is furthermore included instruction in 65–66. Drawing in connexion with manufacture, which is more especially intended for youths working as apprentices in factories or workshops in chemistry, but in which the pupils of the superior industrial school may take part. These lessons are divided into two classes, and are given in the evening 4 times a week to each class. In the lower class, the object is to impart skill in drawing in general; in the upper class the lessons have special reference to manufactures, the pupils being taught to design and draw patterns and ornaments required in their different vocations.

Plan of Studies in the Architectural School.

THIRD CLASS.

General architecture (4 hours). Knowledge of building materials; study of the individual parts of buildings and constructions of various kinds; planning of buildings in general with reference to suitableness, solidity, and beauty. Architectural drawing (6 hours). Delineation of parts of buildings, such as doors, windows, cornices. Ornamental drawing (2 hours). These lessons are given according to Dupuis' method, by the aid of which the pupils acquire first of all a certain amount of skill in drawing generally, after which they begin to draw outlines of simple ornaments. Theory of projection (4 hours). Projection of lines, surfaces, and bodies, of sections of bodies, and intersections (*Durchdringungen*); construction of shadows. Arithmetic (7 hours). The four fundamental rules with whole numbers, common and decimal fractions, with known quantities. Simple and compound rule of three, rules of fellowship, &c.; the four fundamental operations with common quantities; extraction of square and cube roots; equations of the first degree with several unknown quantities; quadratic equations. Geometry. The principal propositions as to congruity, equality, and similarity of plane rectilinear figures. The circle. Determination of the contents of surfaces. The most important stereometric theorems with special reference to the determination of the contents of bodies. Physics (4 hours). General properties of bodies; various states of aggregation; the most important parts of the mechanical theory of physics, and of the theory of heat, light, and electricity. German language (4 hours). Practical exercises in speaking and writing correctly. Orthography. Grammar.

SECOND CLASS.

General architecture (2 hours). Special study of farm buildings, and other buildings connected with agricultural undertakings. Wall-building (4 hours). Special study of structures in stone, and of the earth and water-works connected with these. Carpentering (4 hours). Special study of wooden constructions. Making plans of buildings (6 hours), and more especially of rural buildings. Architectural drawing (4 hours). Practice in the delineation of plans of construction with the help of suitable model drawings. Projection (2 hours). Continuation of the construction of shadows, isometrical projections, and drawing from models; stone-cutting. Ornamental drawing (4

hours). Continuation of the instruction given in the third class with suitable choice of model drawings, so that the pupils may become acquainted with the principal styles of ornamentation. Drawing partly from models in plaster of Paris, partly from model drawings, with more complete elaboration in chalk or Indian ink. Mechanics (4 hours). Repetition of Mathematical theorems together with logarithms and trigonometrical functions. The leading theorems as to statics and dynamics with special application to building. Perspective (2 hours). Explanation of the leading principles of perspective, representation of planes, solids, and bodies with the help of methods of abbreviation. Application of the principles of reflection, light, and shade to simple bodies. German language (2 hours). Continuation of the exercises commenced in the third class, with particular reference to business letters, &c. Grammar.

First Class.

Theory of construction (4 hours) for masons, carpenters, and stone-cutters. Continuation of the instruction given for these particular trades in the second class, but with special reference to the construction of flues, the cutting of stone, and the finishing work in building, consisting of wood and stone in combination with iron, and to the statical examination of buildings. Drawing plans (8 hours). Making estimates (2 hours). Architectural drawing (4 hours). Making models (3 hours) for masons, of vaults, and parts of staircases, and fire-places, &c., &c., for stone-cutters of working of that class, for carpenters of the woodwork of partitions, roofs, &c., &c. Embossing in clay, partly from models, partly from drawings (3 hours). Mechanics (2 hours). Solidity of bodies. Effect of the mechanical powers on combinations of wood and stone. The leading principles of hydrostatics and hydraulics with constant reference to machinery used in the building trade. Perspective (2 hours). Free exercises in perspective, drawings of given parts of buildings, and in making original plans. German language and simple bookkeeping for tradesmen.

Plan of Studies in the Workmaster School.

Third Class.

Arithmetic (7 hours). The four fundamental operations in common, arithmetic and algebra, common and decimal fractions, calculation with known quantities, and the application of proportional quantities. Simple and double rule of three, calculations of interest and percentage, rule of society, calculation of dividends and of mixed quantities, series, powers, and roots, calculation of squares and cubes, of square roots and cube roots. Solution of equations of the first degree, with one and more unknown quantities, and of the quadratic equations, with one unknown quantity. Application of these calculations. Geometry (5 hours). The most important general properties of rectilinear figures, their conguity and similarity, comparison and calculation of their surfaces. Chief properties of the circle and of the rectilineal figures connected with it, calculation of the circumference, and the surface of the circle and its parts. The principal propositions in stereometry, with special reference to the determination of solid bodies. Physics and chemistry (4 hours). General properties of bodies, equilibrium of fluid and gaseous bodies, electricity, magnetism, optics, heat. Fundamental principles of chemistry with particular reference to combustion. Geometrical drawing and rules of projection (8 hours). Projection of lines, surfaces, and solids, in three planes,

sections of solids and intersections, construction and application of curves, construction of shadows, and exercises in Indian ink. Free-hand drawing (4 hours), beginning with Dupuis' method, and when through this a certain amount of skill has been obtained, then drawing of ornaments, especially from models in plaster. German language (4 hours). Exercises in correctness of expression in speaking and writing grammar.

SECOND CLASS.

Mathematics and mechanics (8 hours). Calculation of powers, logarithms, elements of plane trigonometry,' the theory of curves in as far as it is necessary for the comprehension of mechanical science, statistics, solidity of bodies. Physics and chemistry (2 hours). Elements of machinery for supporting, and attaching, for communicating, altering, and regulating motion. Mill-building (2 hours for millers and mill constructors). Foundation works, construction of weirs and ponds, different kinds of mills, particularly flour-mills and saw-mills. Mechanical technology (4 hours). Working of metals, particularly iron and wood. Mechanical drawing (8 hours). Construction and designing, in Indian ink or colours, of parts of machines from sketches with dimensions marked, or from models. Architectural drawing (4 hours). More particularly of wood-work and constructions in stone. Surveying (4 hours). Marking and measuring straight and curved lines, practice in handling the simplest instruments for measuring ponds, mill-streams, &c., &c., levelling, measuring water by guaging, overflow, &c. German language (4 hours). Exercises in composition, particularly subjects relating to business, technology, &c., and exercises in extemporary speaking, and in taking minutes.

FIRST CLASS.

Mechanics (4 hours) theory of the equilibrium and motion of solid, fluid, and aeriform bodies, treated in an elementary manner and limited to such points as are most important with reference to technology, and necessary for a knowledge of machinery. Theory of machinery (6 hours). Continuation of the instruction given in the second class. Power engines; working machines of a kind interesting to all the pupils. Mechanical drawing (8 hours). Making working drawings of machines, designs of parts of machines and of simple machines, the calling of each scholar being held specially in view. Construction of mills (2 hours for millers and mill builders). Continuation of instruction given in lower class. Spinning and weaving (4 hours in each, for pupils specially concerned). Well-sinking and pipe laying (4 hours for pupils specially concerned). Elements of geology; well-sinking, boring, conduits, machines for raising water. The pupils taking part in this branch also join the lessons in mill building which relate to construction of weirs, &c. Free-hand drawing (4 hours); continuation of instruction received in lower class. Industrial bookkeeping (2 hours).

The number of pupils attending the schools during the scnoo year 1866–67, was:

	Pupils.
In the superior industrial school	196
In the drawing school connected with manufactures	29
In the building school	99
In the workmasters' school	54
In all	378

The age of admission is not below fourteen, and a certain amount of preliminary knowledge is required. For those who enter the fourth class, and who mean, therefore, to go through the whole course the requirements are:

The capacity of writing some short theme in German without committing any gross faults in spelling or in grammar.

General knowledge of the elements of history and geography.

Skill in the four fundamental operations in arithmetic, with whole numbers and with fractions. It is further considered desirable that the scholar on entering should be possessed of some knowledge of the calculation of interest and per centage, the rule of society, the chain rule, &c., and with the elements of algebra and plane geometry, physics, natural history and French.

For those who merely wish to take part in special branches of the instruction, the preliminary knowledge required is limited to matters bearing upon that instruction.

The school fee for the full course of one year in each class of the industrial school is 24 thalers (3*l.* 12*s.*). Scholars and hospitants who only take part in certain branches of instruction pay two thalers yearly for one hour weekly in each branch. If the lessons comprise more than three subjects of instruction, the fee is 24 thalers, but in no case is it above this. Indigent and worthy scholars may be exempt from payment of fees.

The expenditure for books, drawing, and writing materials, amounts to about from 12 to 15 thalers. The schools are all day schools.

Hamburg.

Report of a Committee of the Hamburg Society for the Promotion of Art and Industry, on Industrial, Schools and Industrial Musuems, 1863 (see page 4).

(Translation.)

* * * * * Before the committee place before you the result of their labours they think it necessary, out of regard for the society, to state briefly why they recommend the abandonment of the old, and the foundation of new trade schools, for, although they are not in the least disposed to depreciate the beneficial working of these long established schools, they cannot conceal from themselves the fact, that the schools are at present far behind similar institutions in other States.

The causes of this unfortunate condition are so well known to the superiors of the schools themselves, that it will suffice to point out some of the principal deficiencies in order to justify the proposal of a thorough change.

In the first place must be named the smallness of the means at the disposal of the present schools. The committee mean in no way to reproach the society with this fault, as they well knew that it is not possible for it to make a larger grant; they wish only time to state that on this ground the committee has been induced to propose that the trade schools now to be founded should be State establishments.

In the next place the internal arrangements need improvement in many points: a strong organic connection between the various branches of study; a proper distribution of the instructions, and unity of direction, are requisitions which the committee think indispensable if a school is to work successfully, and as these are more or less wanting at

present, they have, in drawing up their plan, taken considerable changes into consideration.

A reorganization as well as a further extension of the schools appears, therefore, desirable under all circumstances, and so much the more so, as at present in Hamburg all obstacles in the way of trade are being cleared away, and it has become necessary for those employed in industry to be prepared to satisfy the greater demands that will be made upon them, if they would not see themselves distanced in the race by their foreign competitors, and the favourable opportunity lost which is now offered for Hamburg to attain a worthy position in the industrial world, in addition to that which she holds as a commercial emporium.

Now, among the means for forming such a great position in industry, the trade school stands in the first rank; the society recognized already many years ago the utility of such an institution, and lent an energetic hand to the work; it will—so the Committee trusts—now also be ready to do its part towards the establishment of a new trade school, in accordance with the spirit of the age.

In this trust, the committee place before it the following

Plan for a Trade School,

the aim of which shall be to give those employed in trades an opportunity of acquiring such knowledge and attainmets as they stand in need of for an intelligent prosecution of their callings.

In order to carry out this object in a comprehensive manner, a complete trade school should be divided into three quite different departments:—

1. A *Sunday* and *evening school* for such pupils as can take advantage of the instruction during the few hours of the week which they have at liberty from their other school time or from being otherwise engaged.

2. *A winter school of architecture* for those engaged in the building trades, and who will be able to give their time exclusively during the winter months to the attainment of theoretical knowledge and skill.

3. *A day trade school* for young persons who have already left the primary school, and are in a position to be able to devote the whole of their time for a year to their industrial education before they are apprenticed to a trade.

Although the education of artisans is the end which these departments have in view, and this can be attained, for the most part, by the same subjects of study, yet there must be a difference between them according to the requirements of the pupils attending the different establishments; and especially as to the time to be given to separate subjects, as well as regards the subjects taught, as also as regards the extent to which they are taught.

Whilst in all three departments the instruction will be, as far as possible, the same, especial regard will be paid, in all the subjects taught, to the profession which the pupils may have already embraced, or for which they may be destined.

I. *Sunday and Evening School.*

The subjects taught comprise:—

1. *Commercial composition and bookkeeping* (orthography, the formation of words and sentences, the composition of letters, invoices, agreements, &c.).

2. *Mathematics.*

a. Arithmetic and algebra (fractions, algebraic notation, equations, 1st and 2nd degree).

b. Geometry (plane and solid geometry).

3. *Physics* (elements of physics in general, the science of heat, elements of acoustics, optics, electricity, and magnetism.

4. *Mechanics* (elementary mechanics, gravity, motion, friction, pressure of water, water power, pressure of air, steam engines).

5. *Chemistry* (elements of inorganic chemistry, special important braches of organic chemistry).

6. *Technology* and *knowledge of implements.*

7. *Political economy.*

8. *Free-hand drawing* (from simple objects, from ornamental objects, figures, parts of machinery, &c.).

9. *Geometric drawing* (drawing by compass), and *geometric figures* (geometrical constructions, measuring and drawing by rule, perspective).

10. *Special drawing with practice in design and construction* (in 5 classes, for building, for manufactures, for workers in metal, for workers in wood, for ship-building.)

11. *Modelling* in clay, wood, and wax.

The course of study is for three years, and the regular entrance of the pupils takes place at Easter. Young persons are received as pupils who have completed their fourteenth year and possess a competent knowledge of the usual branches of school education. To each pupil is prescribed by the superior which classes he is to attend; of course, as far as possible, in this matter the wishes of the pupil or of his relations are taken into consideration.

The school is intended for 600 pupils, and the committee think they may with certainty reckon upon this number, when it is considered that towns such as Nuremberg and Chemnitz have trade schools which are attended by 1,800 pupils.

The average number for each class is to be reckoned at 35 pupils.

The school is under the superintendence of a director, subordinate to him are masters for the various subjects.

The number of lessons weekly, amounts, for each pupil, to from 6 to 8.

Weekly Plan of the Lessons.

	Course of the Year.		
	I.	II.	III.
	Classes. Hours.	Classes. Hours.	Classes. Hours.
1. Commercial knowledge, &c. ..	4 of 2	—	—
2. Mathematics	4 „ 2	4 of 2	1 of 1
3. Physics	—	2 „ 2	—
4. Mechanics	—	—	4 of 2
5. Chemistry	—	—	2 „ 2
6. Technology	—	—	1 „ 2
7. Political economy	—	—	1 „ 1
8. Free-hand drawing	4 of 4	2 of 4	—
9. Geometric drawing, &c.	2 „ 4	4 „ 4	—
10. Special drawing	—	—	6 of 4
11. Modelling	—	—	2 „ 4
	10 Hours.	36 Hours.	48 Hours.

Thus, altogether 124 hours of study weekly.

To the Sunday and evening school there is also a preparatory class annexed, for those who are not yet sufficiently acquainted with the

ordinary branches of school knowledge. This preparatory class comprises the following subjects:—

1. German language.
2. Arithmetic.
3. Geometry.
4. Freehand drawing.

And the arrangement of the classes is as follows:—

1. German language	.. .. ..	2 classes of	2 hours.
2. Arithmetic	.. .. ..	2 „	2 „
3. Geometry	.. ..	2 „	2 „
2. Free-hand drawing	.. .. ..	2 „	2 „
Total	.. ..	16 hours weekly.	

The yearly expenditure for the Sunday and evening school, and for the preparatory class, is estimated altogether at 25,000 marks current, according to the following table:—

	Mks. ct.
For the director, including a salary for 10 hours lessons a week	4,000
Salary for 130 hours lessons a week at 100 mk. ct. each per year	13,000
Rent of premises	5,000
School apparatus	500
Servants	200
Warming, lighting, and cleansing	2,000
Total	25,000

To meet this we may reckon upon a yearly income of 18,000 marks current, viz., 600 pupils, at 30 marks school fees per year, so that a yearly grant is requisite of 7,000 marks current.

II. Winter School of Architecture.

The subjects taught are:—

1. Commercial composition and bookkeeping.
2. Mathematics.
   a. Arithmetic and algebra.
   b. Geometry.
3. Physics.
4. Mechanics.
5. Free-hand drawing.
6. Geometric drawing.
7. Applied geometry.
8. Architectural drawing, and plans of buildings.
9. The art of building, the knowledge of construction, and estimating the cost of buildings.
10. Constructive modelling.

The course of study is for three years, and the instruction is given during the five winter months (November to March), in 48 weekly lessons; besides these written exercises are prepared under the superintendence of a teacher in 12 weekly lessons.

Such persons are accepted as pupils as are engaged in construction, and who are acquainted with the ordinary school knowledge; those who are deficient in the latter are referred to the Sunday and evening school.

The school is intended for 100 pupils; it is placed under the super-

intendence of the director of the trade school. There are masters who teach under and in addition to him.

Plan of the Lessons.

	Course of the Year.		
	I.	II.	III.
	Hours.	Hours.	Hours.
1. Commercial knowledge, &c. ..	2	2	2
2. Mathematics:—			
Arithmetic and Algebra ..	6	3	1
Geometry	6	3	
3. Physics	2	1	—
4. Mechanics	—	—	4
5. Free-hand drawing	8	8	6
6. Geometric drawing	8	—	—
7. Applied geometry	—	8	—
8. Drawing of buildings	16	16	20
9. Art of building, &c.	—	7	7
10. Constructive modelling	—	—	8
	48	48	48

Besides this, 12 hours are set apart weekly for the preparation of written exercises, under the superintendence of a teacher for all the classes in common, at the same time, participation in this instruction is not obligatory for those who undertake this work at home.

The yearly expenditure is estimated at 8,300 marks current, viz.:

	Mks. ct.
For superintendence, including salary for 6 lessons per week	1,000
Salary for 150 lessons per week, for 5 months, at 40 marks per lesson	6,000
School apparatus	300
Servants	150
Premises (those of the Sunday and evening schools) ..	—
Warming, lighting, and cleansing	850
Total	8,300

Against this we may reckon upon a yearly receipt of 5,000 mks. ct., viz., 100 pupils at 50 marks, so that an annual addition of 3,300 mks. ct. will be necessary.

III. The Day Trade School.

The subjects taught comprise:—

1. German and composition.
2. Mathematics.
   - *a.* Arithmetic and algebra. (Fractions, algebraic notation, equations of the first and second degree, powers, and roots, logarithms.)
   - *b.* Geometry. (Plane and solid geometry.)
   - *c.* Trigonometry. (Plane trigonometry.)
3. Physics. (Physics in general, science of heat, principles of the remaining branches.)
4. Chemistry. (Inorganic, and some sections of organic chemistry.)

5. Free-hand drawing.
6. Geometric drawing.

The course of lessons is for one year, and the regular entrance of pupils takes place at Easter.

Such young persons are accepted as pupils, as have completed their fourteenth year, and who show proof of the requisite capacity to comprehend the above-named subjects.

The school is primarily intended for a class of 35 pupils, it is placed under the director of the trade school. A master instructs in the head branches, assisted by teachers. The annual expenditure is estimated at 5,200 marks current, viz. :—

	Mks. ct.
Salary of the head-master, who gives 24 lessons per week	3,000
Salary for 18 lessons per week.	1,800
Premises (those of the Sunday school and evening school)—	
School apparatus	200
Servant	50
Warming	150
Total	5,200

Against this we may reckon upon an annual income of 3,500 marks, viz.; 35 pupils at 100 marks, there will be requsite an annual addition of 1,700 marks current.

A trade educational establishment, comprising :—

a. A Sunday and evening school,
b. A winter school of construction,
c. A day trade school,

would, therefore, require an annual expenditure of 38,500 marks current; deducting from this the estimated annual receipt of 26,500, there will remain to be asked an annual grant of 12,000 marks current from the State.

The committee believe that in estimating the expenses of these schools, they have kept within attainable limits, and doubt the less, the obtaining of an annual contribution of 12,000 marks, as the municipality have already declared their readiness to devote a sum of this amount annually for the promotion of industry.

Whether, in fact, the annual receipt of 26,500 marks from the school proceeds is rightly estimated, we shall first learn from the results; at all events it was not at present possible to reckon the school meaning otherwise than uniformly, and it will be in the power of the State, or of private benevolence, by the creation of wholly or partially free admittances, to give entrance to these schools to such as are without means.

As a second means towards the support and promotion of the industry of our city the committee recommend the establishment of an *industrial museum with exhibitions of products*, after the model of those in other States, especially in Wurtemburg, England and France.

Although for years past the importance of education through the eyes has been recognized as essential for the completion of instruction proper in industry, still a long time elapsed before the example of France, who in 1783, founded the "Conservatorie des Arts et Metiers," has been followed in other countries.

It was only in 1850 that an exhibition was opened at Stuttgart, under the direction of the Royal Academy, for industry and commerce, and it was first the great Universal Exhibition in London, in the year

1851, which induced the English to found their richly endowed Kensington Museum. Since that time, in many places, efforts have been made to supply this deficiency, and at this time we hear of even small towns which are occupied in the establishment of industrial museums.

In presence of these facts the committee have, from the beginning, taken such an institution into consideration, and they think it the more desirable to be able to found it, as the special experience of Wurtemburg is most favourable as to the utility of such an establishment.

In addition, the foundation in Hamburg of an industrial museum is to be recommended on commercial considerations. Hamburg despatches daily to the interior, raw materials; travellers from Hamburg range through the interior in order to find out objects of export. Might not in many cases the manufacture of these materials be carried on here? In the second place might not many Hamburg manufactures, which have already obtained a good reputation abroad, attain still greater success if the manufacturers, profiting by the beautiful forms brought under their eyes in a museum, were to employ these in their fabrics.

Hamburg is certainly right, if by the promotion of its home industry it can give new springs of life to its commerce which stands in such a close connection with it, and the society will feel it the more urgent to proceed speedily in this matter, as it is known that a similar undertaking on a grand scale is projected, from which, however, the committee expect the industry of Hamburg will derive but little benefit.

The aim of such an institution as the Committee proposes, is to promote existing trades, to call forth new ones, and to increase the sale of manufactured goods. This aim is to be reached by the exhibition of raw materials, of the process of manufacture of improved implements, and of superior products of industry, with special regard to the formation of taste.

The arrangement of an industrial museum will be as follows:

I.—*A Technical Section.*

This contains raw materials, manufactures in process, implements, models, &c.

The collection of raw materials, and of manufactures in the different stages of their preparation should have in view an exact knowledge of their origin and price as well as of their uses, and at the same time should point out new uses. The collection of implements, utensils, and machinery should indicate means to the artisan of working better and at less cost.

II.—*A Section for Art Manufactures.*

This comprises casts, engravings, drawings, photographs, &c., which ought to serve especially in the formation and improvement of taste in industrial respects.

III.—*The Exhibition of Products.*

This section contains especially good or useful new products of industry. The artisan should here be made acquainted, from seeing the fabric itself, with new combinations, beautiful forms, and new employment of materials, &c., in order that he may perceive clearly the possibility of a profitable new or improved manufacture. The com-

mercial interest will also find here new fabrics, and be made acquainted with their origin. Every object should have attached to it the price, and the name and residence of the manufacturer.

A fourth section, a *permanent exhibition of Hamburg industrial products*, was at first included in the plan of the committee, but it has been given up in consequence of the experience of Stuttgart, mentioned in the travelling report.

The whole establishment is under the superintendence of a director, who should pay close attention to home and foreign industry, in order to develop the former from the experience of the latter. To this end he must place himself in correspondence with foreign exhibitions and industrial societies, &c., as also with the consuls for Hamburg, and with the home manufacturers.

Entrance to the museum should, as far as possible, be facilitated, and therefore the committee think it desirable on four days in the week to give admittance to all gratis, and on the other days to charge a moderate price of admission, in order in this way to gain a contribution towards the considerable cost of the yearly maintenance.

The use of the museum must always in a manner be open to the trades schools, as they have a free claim to the use of the drawings and models therein contained, as means of teaching.

The committee think it necessary to give a right to the manufacturers of the city, not only to study the fabrics in the different sections in the locality of the exhibition, but if they desire it, at times, to take these home with them for closer study, and the travelling report contains a detail of the grounds why, from experience, the granting of this right to persons occupied in industry is most highly to be recommended.

The conclusion of the recommendations of the committee treat of the question of the organization of the administration. The chief point on which they have come to a decision was, whether both institutions should be founded as private or as State establishments, and the committee have decided for the latter, after a thorough investigation of all the points of view of the question.

The grounds which, according to the opinion of the committee, are in favour of this, are the following: the State has an unconditional obligation to promote, in a suitable manner, such an important institution for the public as a trade school, and it is not possible to deny it the right of taking the promotion of this object into its own hands. It is the more essential in Hamburg that the nature of the two institutions should be public as they cannot be created or supported in a desirable manner without the aid of the State, as sufficient private means for this end do not exist, nor could they be got together by subscriptions.

Already, in the beginning of their report, the committee have stated that a deficiency of means was the chief cause why, unfortunately, the existing trade schools did not accomplish what they now intended to do, and what the same institutions in other countries are able to effect for the industrial interest, because they are supported by the funds of the State. With still greater justice the committee can now repeat their former assertion, as they have estimated that a yearly contribution of 27,000 marks on the whole is necessary for the two institutions, and as this sum could never be brought together for any length of time, or with certainty by any private society in Hamburg, for trade purposes, but could only be instituted by the State.

But even if it were possible State institutions would always have an advantage over private establishments, because the former would have an assured existence, and would offer a better guarantee for a successful

development, and for keeping pace with all the demands of future years.

As a chief point in the administration, the committee lay down the principle that these two institutions, so nearly related in their aims, should be together placed in the hands of one and the same public council attached to the State administration. This council should, besides attending to the obligatory administration of the two institutions, serve as a competent board to decide on all questions concerning industry, until the committee of trade shall be instituted, which is provided for in Article 93 of the Constitution; in case of need, they should be consulted by the authorities, and for the present fill the office of the future trade council.

In this case the name of interior trade committee would be a proper designation for this board, so long as this intermediary state lasts.

As regards the composition of this new council, the committee proposes to form the same of the following persons:—

1. A member of the Senate as President.
2. A deputy from the upper school administration.
3. Four to be chosen by the municipality from the machine makers or manufacturers, of which at least one must be a large manufacturer a nd also belong to the body of merchants.
4. The two members deputed by the society.
5. The director of the trade school.
6. The director of the industrial museum.

The representation of the society in this council is justified because it is a body recognized by the State, and has for a century busied itself with the promotion of industrial interests in Hamburg, and has especially served these interests by its schools; also because it will render an essential service in the proposed cession of its premises, and in giving its school apparatus free of cost, when these institutions shall be created.

APPENDIX.

Wurtemburg and Frankfort.

TRAVELLING REPORT.

To the Committee for Trade Establishments.

The undersigned have, in consequence of a commission entrusted to them, undertaken from the 11th to the 22nd November, a journey to Carlsruhe, Stuttgart, Nuremberg, and Frankfort-on-the-Maine, in order to acquaint themselves with those trade institutions in these towns which have a like aim in view, as those which the committee have under consideration.

The undersigned have, as far as feasible, inspected the schools closely, and been present during the teaching, they have also examined the exhibition at Stuttgart, with special attention. Particular conferences have been held:—

At Carlsruhe—With the president of the upper school council, Dr. Kniess, the upper school councillor Mr. Frick, and with Professor Grashof;

At Stuttgart—With the director of the Royal Academy for industry and commerce, Dr. Von Steinbeis, the director of the school for the promotion of industry, Professor Gugler, the director of the Sunday school, Professor Gruner, the director of the winter school of construction, court surveyor Egle; the manufacturer, Dr. Ammermüller, as well as with several engaged in trades, and with the officials of the exhibition;

At Nuremberg—With the rector of the trades' school, and president of the society of industry, Dr. Rose, the director of the art-trades' school, Professor Kneling, and with several masters in these establishments.

At Frankfort-on-the-Maine—With the director of the trades' schools, Mr. Adelmann, the head-master Dr. Poppe; the director of the school of commerce, and the academy for commerce and industry, Mr. Röhrich; the director of the board of industry, Mr. Schiele; and with Messrs. Werth Brothers, as founders of the permanent exhibition of machinery in that place.

In continuation we will now give a description of the establishments visited, and will add thereto any remarks that may be of special application to the undertaking of the committee.

1. *Trade Schools.*

A.—In Baden:

In consequence of the freedom of trade now introduced into Baden, trade schools are there in process of transformation. The Government of Baden and the corporation being led to think that the freedom established by the new trade law, forms a most urgent reason for the promotion of improvement in matters of trade, that those who would be independent as masters and managers should be as well acquainted with the theoretic part of their subject as with the practical, have to this end, devoted their greatest attention to the promotion of industrial education.

The Baden trade schools are municipal establishments, on which the State exercises an influence by suitable support. Whilst, as a rule, the municipality only furnish buildings, warming, and lighting, and according as their means allow, or with the help of existing foundations contribute to the salary of the masters, the State undertakes the completion of the stipends, or if necessary the entire payment of the teachers, as well as the providing of school apparatus. In addition, the State places the whole of the trade school educational staff, upon its pension list. It follows that the nomination of the teachers in Baden is wholly undertaken by the State, without interference from the municipality. The salaries amount to from 500 to 1,200 florins annually, the allowances for school apparatus from 50 to 200 florins. It may also occur that in some branches of study, intelligent men engaged in industry give their services gratis as teachers, or that persons employed in public offices, &c., in order to increase their income, make themselves of use in the same way.

For the direction and superintendence of the several trades' schools, which are together under the council of the upper school, there is for every school a board consisting of:—

The amtmann (chief magistrate) as grand ducal commissioner;

The burgomaster as president;

The pastor;

The inspector of buildings;

and three or four persons of the place who are employed in industrial pursuits. The teachers are present at all the meetings of the board, and may have a voice in them.

The Baden trades' schools are partly day, partly evening schools, or both at the same time. To the greater number a preparatory school for less advanced pupils is annexed. The schools themselves have, as a rule, classes for three years, in which the following subjects are taught:—

a. In the Preparatory School.

	Lessons weekly.
Free-hand drawing	2
Modelling	2

b. Class I.

Composition	2
Arithmetic	2
Geometry	2
Geometric drawing	2
Free-hand drawing	2
Modelling	2

c. Class II.

Composition	2
Geometry	2
Technical natural philosophy	2
Geometric drawing	2
Special and ornamental drawing	2
Modelling	2

d. Class III.

Political economy and bookkeeping	2
Technology	2
Geometric drawing	2
Special and ornamental drawing	2
Modelling	2

The school fees in Baden are very moderate, from one to two florins annually, and are frequently entirely remitted. The attendance at the trades' schools is considerable, for example, the trades' school at Wertheim has above 200 pupils out of a population of about 7,000.

B.—In Wurtemburg.

Here, where the royal ministry for industry and commerce is striving without intermission to effect the improvement of industrial education, the following schools (at Stuttgart) merit special mention:

1. The Sunday trades' school, the object of which is to impart to apprentices and journeymen whose time is partly taken up by their trade work, instruction in the branches of knowledge and the attainments most necessary in their callings. (Sundays and on one evening in the week.)

2. The advanced trades' school (*Fortbildungs schule*), where on Sundays and in the evening hours a more comprehensive instruction is imparted, than can be given in the former school, in all branches of knowledge useful in industrial pursuits.

3. The winter school of construction, which is intended to give to apprentices and journeymen employed in building trades a special education for their calling, by instruction and practically.

Besides these, there is an under and upper school of arts (*Real-schule*), where also technical subjects are taught, but these serve more as preparatory schools to the polytechnic school.

From the excellent arrangements, and the very successful working of the Wurtemburg trades' schools, it is desirable that we should enter more in detail as to the organization of those inspected by us.

1. *The Sunday Trades' School.*

The instruction is divided into two chief sections, those of science and of arts, and comprises:—

Arithmetic.
Geometry.
Business composition (with instruction in the laws of exchange).
Geometric drawing, and principles of applied geometry.
Drawing of buildings.
Special drawing:
a. For cabinetmakers, glaziers, and allied trades.
b. For locksmiths, mechanicians, coppersmiths, gunsmiths, cutlers, &c.
c. For wheelwrights, smiths, saddlers, coopers, &c.
Free-hand drawing and special drawing:
a. For house painters, lithographers, engravers on copper.
b. For workers in gold and silver, belt makers, engravers, confectioners, &c.
c. For workers in tin, turners, bookbinders.
Free-hand drawing for various trades.
Technical model drawing, with instruction in perspective drawing.
Modelling.

The regular terms begin in the spring and in the autumn, on payment of a school fee of four florins, which may be reduced or entirely remitted. It is required from apprentices that they should attend the school regularly during the whole term of study, for which a certificate is given to them. For continual non-attendance, or constant want of application, &c., they may be expelled.

2. *The Advanced Trades' School.*

The instruction is for pupils who are in some degree advanced, and comprises:—

	Lessons weekly.
Commercial composition	1
Arithmetic	2
Elementary geometry	2
Descriptive geometry	2
Modelling	2
Ornamental drawing	3
Figure drawing	3
Geometric drawing (introductory to trades and machine drawing)	1
Trades' drawing (from models for each special trade)	3
Machine drawing	3
Mechanics and knowledge of machinery	2
Physics	2
Knowledge of chemicals	2
Lectures and special branches of applied chemistry	2
French language (if there is sufficient attendance)	1

The ordinary instruction lasts for six months (from the middle of October to the end of April); the instruction in drawing and modelling goes on till the middle of August. For drawing, and such branches of

knowledge as require practice in drawing, the lessons are two hours long, and, for the remaining subjects, one and a half hours long. The choice of the several branches of study is free to the pupils if they are properly prepared to follow them, and no doubts arise as to the unsuitability of the choice. For the general instruction in drawing (as the attendance is almost entirely composed of pupils from the Sunday school, plaster casts are mostly used, of which a very complete collection is provided. For instruction in machine drawing, suitable wooden models, real implements, &c., are used; the special trades drawing is mostly from models by Frick, Kaufmann, Haindl, and others.

The school fees amount to from four to six florins, according to the number of subjects learnt.

The pupils must attend the classes chosen by them as regularly as is possible. For the non-attendance of apprentices an excuse must be made in writing, either by the master or the father. If admonitions, on account of irregular attendance, disorderly behaviour, &c., are without effect, expulsion follows. Those pupils who have distinguished themselves by diligence and marked improvement receive, at the end of the course, a written testimonial from the head of the school.

The yearly receipts of this school, exclusive of premises given rent-free by the State, amount to 5,500 florins, viz. :—

	Florins.
School fees	1,500
State contributions	2,000
Grant from the commune	2,000
	5,500

We may here remark that, on the foundation of trades' schools in Wurtemburg, the State is always ready to grant an equal sum to that which the commune concerned contributes.

Besides the advanced school above described, there is also in Stuttgart a day drawing school, on the premises of the Royal Central Bureau *(Centralstelle)*, which is open from nine o'clock in the morning till evening. Here instruction in drawing and modelling is given gratis, a good preliminary knowledge being taken for granted. The rich collections of the museum gives an opportunity to advanced draughtsmen of practising designs. When we are describing the museum, this school will be further mentioned.

3. *The Winter School of Construction.*.

This comprises a preparatory school, and classes for four years. The instruction includes the following subjects :—

a. Preparatory School.

German language.
Writing.
History and geography.
Arithmetic.
Geometry.
Free-hand drawing.
Geometric drawing.

b. 1st Class.

German language.
Writing.
Algebra.

Geometry.
Ornamentnl drawing.
Architectural drawing.

c. 2nd Class.

German language.
Natural philosophy.
Trigonometry.
Practical geometry.
Applied geometry.
Ornamental drawing.
Architectural drawing.
Knowledge of building.
Knowledge of the construction of buildings.

d. 3rd Class.

Mechanics.
Descriptive geometry (as applied to wood and stone cutting, perspective and construction of shadows).
Architectural drawing.
Ornamental drawing.
Knowledge of building materials.
Knowledge of the construction of buildings.
The conducting of building and building laws.
Knowledge of combustibles.
History of building.

e. 4th Class.

Ornamental modelling,
Knowledge of building.
Knowledge of the construction of buildings.
Construction of roads and bridges.
Estimating the costs of buildings.
History of buildings.
Plans of buildings.

Besides this, pupils in the lower branches of hydraulics are intrusted in the construction of mills and waterworks.

The number of lessons weekly for each class is from 36 to 46. The classes are so arranged that the pupils can find time in the middle of the day to practice and study their tasks in the school-room. To the pupils in general are prescribed the lessons most suitable for their callings, and they are bound to attend them regularly and to prepare for them properly. Special pupils may choose what branches of study they will attend. No one may be absent from a lecture without leave from the superior.

This school is at present attended by 630 pupils, who are not exclusively employed in building, and in the year 1864 a summer course is to be founded for which they reckon with certainty on 300 pupils. The school fees amount to 12 florins per six months, the annual expenditure. to which the town contributes 800 florins, amounts to 16,000 florins. Next year, on account of the summer course, the expenses will mount up to 24,000 florins, and the school will probably assume more the character of a day trades' school.

C. *In Bavaria.*

In every town in Bavaria there are trade schools organized on the

same system, therefore the Nuremberg school may serve as an example of the rest. Firstly, there are here three different trade schools:—

1. The district (*Kreis*) trades' school.
2. The Sunday school for artisans.
3. The elementary drawing school.

The first has the aim of affording instruction to persons who require for the intelligent pursuit of their several callings a knowledge of mathematics, of natural philosophy, and facility in drawing and modelling, or to such as wish to devote themselves to the technical service of the State. It also serves as preparatory to the Polytechnic School. The instruction embraces in a course of three years:—

Religion, German and French languages, history, geography, elementrry mathematics, physics, theoretical and practical chemistry, mechanics, technology, free-hand and linear drawing, modelling in clay and wax.

The first instruction in drawing is according to Wolff's principles of ratienal instruction in drawing; the more advanced from large drawings and solid objects. In all the classes there are from 7 to 8 hours for drawing weekly.

The Sunday school for artisans gives instruction to apprentices and journeymen in drawing, modelling, engraving, arithmetic, geometry, physics, and chemistry. The instruction in drawing, in three courses, begins with free-hand drawing according to Wolff's system; then follows the drawing of ornaments, vases, &c., in outline, with reference to the trade of the pupil, geometric drawing, drawing from bas-reliefs; finally, in the last course, special drawing. This is divided into four sections:—

a. For builders.
b. For joiners.
c. For turners.
d. For workers at various trades.

The elementary drawing school is for those boys who are still attending the popular school, and who wish later to engage in a trade, after which they enter into the trade school. In two courses drawing and modelling alone are taught.

All the schools in Nuremberg have a large number of pupils. This year the first has 212, the second 1876, and the last 228 pupils. The school fees in the trade school and the elementary school amount, at the most, to 2 florins annually; on the other hand, there is for apprentices and journeymen under eighteen years of age, a strict compulsory school attendance.

	Florins
The annual income of the above-named Nuremberg schools amounts, exclusive of premises rent free, to	16,000
Amount of school fees received	1,800
Florins	17,800

It is deserving of mention that the establishments in Nuremberg possess a library, out of which works of general utility and belles lettres are lent to diligent pupils. It thus gives an opportunity of rewarding good behaviour, and is also calculated to impart much information which the school does not teach. A bad choice of books is also in this way presented.

Whilst in Baden and Wurtemberg there is no longer a compulsory attendance at the trades' schools, this is most strictly observed in

Bavaria, so that the pupils are even taken to the school by the officers of police; it is unnecessary to remark that this arrangement is not to be recommended. In the former countries, since attendance has been no longer compulsory, not only the good results but also the attendance at the trades' schools has increased, of which the following is a striking example:—At Geislingen, the trades' school could with difficulty reckon upon 60 pupils; shortly after the abolition of compulsory attendance the number mounted up during this summer to 160, and now the space does not suffice for all who are desirous to attend. It has been experienced that by compulsory school attendance a useless ballast of bad pupils is taken to the trades' schools, which, while it principally occupies the time of the master, is quite detrimental to the progress of the good pupils. The Bavarian trades' schools will likewise shortly be reorganized.

There exists also at Nuremberg, quite apart from the other trades' schools of the country, the Royal School of Art, which, reorganized a few years ago, is under special regulations. It aims at promoting the connection between art and industry, and is therefore an institution for more advanced youths, who wish to receive a higher education in some branch of art or industry.

Not only every branch of art is studied exclusively by itself, but these branches, which stand in the closest connection with works, such as architecture and sculpture, with particular regard to the needs of industry and works of art, form the principal subjects of instruction. This object is held exclusively in view in the lessons in ornamentation, this being a branch of study specially introduced for the purposes of industry.

The principal subjects are:

1st *Division.*

1. Drawing from models:

	Hours weekly
a. From ornamental models	12 „
b. Practice in architecturic drawing, combined with theoretic instruction	12 „
c. From antique models	12 „
2. Modelling from models and drawings either of ornamental objects, or from the antique	21 „

2nd *Division.*

1. Instruction for artists at indefinite hours of the day:
a. In painting, drawing and modelling, from the life.
b. Plaster study.
2. *a.* Exercise in the composition, invention, and execution of figures and ornamental objects.
b. Instruction in embossing, sculpture, and wood carving.
3. Execution of real objects of art and industry.

As Auxiliary branches of study, perspective with the construction shadows and anatomy are taught. For all objects of study, the royal and the town collections as well as those of the schools, are used according to the individual need.

For instruction in drawing and painting, the study of the antique is to be looked upon as the unconditional foundation. Instruction in sculpture begins as a rule in the same way, especially for such pupils as may wish to perfect themselves as artists or modellists in manufactories. In later designs and inventions of plaster objects, the principle must be

especially observed that every form is to be adapted to the material in which the object is intended to be executed. The school of ornamentation has principally in view the formation of skilled draughtsmen for industrial objects or designers in manufactories. The instruction in architecture is divided into general instruction in this art, and the application of it to the interior of houses, chimneys, &c., as also to furniture and things of that kind.

Each pupil, on his admittance, must acquaint the director with the calling which he intends to follow, and the director points out to him the requisite branches of study and their order of succession. The pupil is required to regulate his studies accordingly. He is at any time free to leave the school; no examinations take place, but there are public exhibitions of the finished works. The plaster models executed by the pupils remain the property of the institution, as also some portion of the drawings. The school fees amount to from 5 to 15 florins per six months.

The reputation of this school is already considerable, so that even from a distance commissions for designs of artistic objects are sent to them, which are executed by the more advanced pupils. Director Kreling remarks that this result has only been rendered possible by carrying out the most solid artistic education with unremitting strictness. The Board of Directors demand much from masters as well as from pupils.

D.—At Frankfort-on-the-Maine.

As the circumstances of this free term have a great resemblance to our own, the arrangement of its trades' schools must have a special interest for us, and a description of their administration will here be in place.

The Frankfort trades' schools are founded by a society, which formed itself in 1816, after the pattern of ours, the "Society for the Promotion of useful Arts and Allied Sciences at Frankfort-on-the-Maine.

These consist of:

1. A Sunday school for artisans.
2. An evening school.
3. A higher trades' school.

The first aims at the completion of elementary education for such young persons as have already left the popular school. The second offers exclusive instruction in industrial technical drawing. The higher trades' school however:

1. Gives to those who wish to devote themselves to some branch of technical industry in the most comprehensive sense of the word; instruction which enables them to enter the special classes of higher institutions, and the polytechnic school.

2. Gives an opportunity to those who wish to embrace a trade of acquiring the attainments requisite for their calling. As far as is compatible with these principal aims; instruction in general knowledge is also provided.

It having been considered unnecessary for all the pupils to go through the entire course up to the highest class, the plan of study has been so arranged that each class is, in a manner, complete in itself. Therefore, according to the grade of education requisite for the future calling, one division of the pupils (for example, those intended for the building trade), after passing through the second class, leave, furnished with sufficient acquirements and technical facilities for their calling, whilst to those who wish to devote themselves to architecture or engineering, must continue their studies in the first class.

The objects taught are the following:—

Mathematics. (Arithmetic, algebra, geometry, trigonometry, analytical geometry, practical geometry, analysis.)

Natural philosophy.

Physics.

Chemistry.

Mechanics and knowledge of machinery.

Descriptive geometry.

Drawing of buildings and machinery.

Topographic drawing.

Free-hand drawing.

German language.

French language.

History and literature.

Geography.

Caligraphy.

For attendance at the Sunday school there are no school fees, but only a moderate entrance money is demanded. For the evening school the fees are 6 florins annually.

In the higher trades' school these amount to:

	Florins.
For the 4th class	30
„ 3rd class	30
„ 2nd class	40
„ 1st class	50

besides 2 florins entrance money.

It is intended, however, to raise the fees in all these institutions.

The costs of the higher trades' school are covered by the school fees and the contributions of the Society; the expenses of the Sunday and evening school, by the school fees collected each month, by contributions from the treasury of the Society, and by the interest from a special school fund. This, of which the capital cannot be touched, is in the trusteeship of the Society, and is increased:

1. By legacies and donations.
2. By entrance fees to the Sunday school.
3. By the interest of that portion of the fund which is less than 1,000 florins complete.*

The administration of these three schools is carried on by a Board of Directors, consisting of 9 members chosen by the Society, of which three go out annually. The members choose among themselves always for a year,—

A director,

A vice-director,

A secretary,

A treasurer,

A manager, and

An assistant-librarian.

The immediate direction is given to a head-master, who has to look after the maintenance of the fixed plan of study and lessons, the behaviour, the assiduity, the docility, and health of the pupils; that the masters fulfil their duties properly; as well as every thing connected with the school, and the carrying out of the orders of the Board of Directors.

The director conducts all business matters, presides at the con-

* Hitherto we have been able to obtain no information as to the annual expenditure.

ference of the masters, and represents the schools at the committee meetings of the Society.

The business of the board of directors consists in:

1. The settling of the plan for study and lessons, of the books, and of the providing the school apparatus.

2. The arrangement of the examinations of the distribution of prizes, and of the holidays.

3. Appointment and dismissal of the masters.

4. Management of the funds; also

5. The members must consult with the teachers as to the carrying out of the instruction, and also from time to time be present at the same.

The head-master may be invited to attend the meetings, and to have a voice in them, whenever it seems advisable.

Besides these schools, there exists in Frankfort a commercial school, also created by the Society, and in connexion with it an academy for commerce and industry, which we need not here take into consideration; the prospectus of both are placed as appendices to this report.

After the description of the institutions inspected by us, we must add the following remarks upon a general review of the plan of the committee before us.

In all these trade schools the greatest value is always placed upon the instruction in drawing. Free-hand drawing is begun from the flat, and goes on as soon as possible to drawing from the round and from plaster casts, in which particular regard is paid to ornament. Even with the more advanced pupils less regard is paid to shading and the formation of shadows, than to the outline. Only the best pupils are occasionally allowed to undertake shading, and then only with the stump. *(Wischer.)*

Linear drawing is, as a rule, begun with the construction of geometric figures, by which the pupil is practised in the use of the rule, the compass, and the drawing pen, he then proceeds to the copying of simple implements, to which succeeds drawing from wooden models, and, lastly, exercises in construction.

The descriptive geometry as taught at Stuttgart and Nuremberg is very profitable for various trades, such as workers in tin, bookbinders, &c., as the pupils are taught the drawing of net work, the intersection of plane surfaces, &c. With linear drawing it might be advisable, as far as possible, to divide it according to industries, especially in the higher branches.

On the fixing of a plan of lessons for a Sunday and evening school, it appears advisable that as far as possible the artistic instruction should be given in the evening, and the scientific in the day time, as it is found from experience, that in general, workmen are too exhausted after their day's work for attention to subjects such as mathematics for instance, whilst they appear sufficiently fresh for instruction in drawing.

With regard to the scientific branches, there is but little to remark, as the plan of the committee has fully provided for all that is requisite. If political economy has till now been taught only in the Baden schools it is because in other places they had not sufficient teaching power for it. Everywhere a high value is placed upon instruction in trade bookkeeping, and commercial affairs.

For the greater part there are preparatory classes for less advanced pupils, where boys from the popular schools attend the instruction in drawing.

The amount of school fees laid down in the plan of the committee

appears to be properly estimated. The general opinion is that these cannot, with advantage, be made too low, but with regard to this, local circumstances must, of course, be taken into consideration. The pupil learns to place a higher value upon the school and tries to profit by it more if he pays a larger school fee, and by this means bad pupils are kept away, to whom the school is of no great advantage, and who make demands upon the time of the teachers at the cost of the more worthy ones. As for the rest the greatest possible freedom to the pupils is to be recommended, while the strictest observance of the rules of the school should at the same time be demanded.

The division into classes of from 35 to 40 pupils is everywhere looked upon as a very good arrangement.

It stands to reason that in all the States great attention is paid to the forming of efficient trades' school teachers, and in Wurtemberg the museum of industrial products is used with great advantage in this respect, as will be seen from what follows.

The undersigned having concluded their report of the trades' schools inspected by them, have added in 10 appendices the statutes and hours of lessons of the same, and now proceed to describe.

2. The Museum of Industrial Products of the Royal Institution for Industry and Commerce at Stuttgart.

This is destined to aid in the promotion of existing industries, as also to lay the foundations of industries in general, but it is in no way occupied with the promotion of any one special branch of industry.

The principle which is the groundwork of the institution, is the general aim of improving the elements of industrial occupation by exhibitions of real objects and consequent encouragement to study, and to make these accessible to all.

The museum contains, in spacious rooms, a rich collection of German and foreign manufactures, a great number of useful machines and implements of all kinds, an excellent collection of industrial art, a trades' drawing school, a library, a reading room, and a chemical laboratory.

The collection of manufactures, arranged according to the annexed plans, contains:

Leather and leather work, work and carvings in wood, ivory, horn, cocoa-nut shell, &c., inlaid furniture, works in clay, cement, earthenware and china, bricks and tiles, glass-ware and glass paintings, articles made of wax, papier-maché, gutta-percha, caoutchouc, plaster, &c., bookbinding and portfolio makers' wares, brushes, paint brushes, combs, basket work in straw, osier, and reeds, patterns of clothing and ready-made clothes, nets and hooks, fabrics, and fabrics in process, made of wool, silk, cotton, flax, hemp, jute, &c., colours, chemicals, combustibles, pencils, oils, glue, instruments for measuring, measures, scales and weights, implements for drawing, apparatus used in cooking, in the house, for lighting, warming, and extinguishing, agricultural and garden tools, locks and keys, door and window fastenings, works in tin and copper, &c.

On account of their origin we must particularly notice the many patterns of printed, embroidered, and woven stuffs, as well as of paper-hangings. There are business houses in Paris who receive subscriptions for the supply of all the new patterns brought out, and who furnish annually to their subscribers from 200 to 400 specimens. The Royal Wurtemberg Industrial and Art Department is in correspondence with such a house, Messrs. T. C. Claude, brothers, 32, Rue du Sentier.

Paris, and pays, for example, 250 francs annually for about 300 new new patterns of hangings. The patterns are tolerably large, and from them drawings might be made for other purposes. All the patterns are bound together, with a notice of the price and plan of origin, and form a valuable portion of the library, which is more especially useful to merchants. T. C. Claude, brothers, undertake, among other things, subscriptions for drawings of the most modern Parisian furniture.

Apart from this collection of manufactures, the division for machines and implements is to be found in an opposite room.

As motive powers to set in motion the other machines there are exhibited: a caloric machine, a machine moved by gas, by Lenoir, a two-horse locomotive, as well as a stationary steam-engine. After them are placed in rows articles of machinery, viz., a collection of English castings, such as: water and steam cocks, pumps, level indicators, balances, valves, grease boxes, gas apparatus, dyanometers, &c. Further on are articles of wrought and cast-iron, hydraulic and other presses, an hydraulic crane (Hebervinde), a screw windlass, machine for raising water, fire engines, weights, flour and crushing mills, looms, boring machines, implements for drilling and turning, machines for hammering and planing, implements for various trades, &c. Besides these there are machines and contrivances for helping in household works, sewing machines, washing and drying machines, apparatus for filling and corking bottles, beer pumps, &c.

The industrial art division of the exhibition numbers nearly a thousand beautiful works, executed for the most part by the newest processes of art printing. These are arranged according to trades, and contain works of ornamentation and art industry, for mechanicians, builders, joiners, paperhangers, coach-builders, house-painters, workers in metal, earthenware manufacturers, as well as embroidery and other needle workers, for weaving, book printing, and instruction in drawing.

There are also exhibited a quantity of photographic pictures, and a great collection of price catalogues, and price lists, which besides giving information as to prices and plans of origin, help also in the drawing up of similar catalogues.

A great part of this collection is made up by the apparatus for instruction, and here we may particularly mention with approbation the rich collection of plaster and paper copies, as well as the plaster figures for the drawing school. This collection, from the way in which it is arranged, gives also an opportunity of studying the various styles of art.

The public drawing school is annexed to the industrial art collection, and has already been mentioned in the first part of this report. This is attended by artisans, who use the collections for their own special callings, and also by those learning art industries, but especially by the teachers who wish to perfect themselves for giving instruction in drawing. We may particularly mention that, in the industrial art division, artisans receive artistic instruction gratis, and make diligent use of it. A printed illustrated catalogue, with a list of the prices, of the plaster casts which are of the most importance in drawing, is here subjoined.

The chemical laboratory, which is annexed to the exhibition, has the aim of making experiments as to new discoveries in the department of chemical industry, as well as of undertaking the execution of analyses. Of these, from 500 to 600 are made annually for manufacturers, and at very moderate prices, almost under cost price.

The not inconsiderable library of the exhibition, which embraces

the department of industrial activity and commerce, is much used, as also the reading room, in which about 70 periodicals relating to industrial, commercial, and economical subjects are taken in, as also the directories of large commercial towns, and a list of the patents granted in England and America. Lastly, there is in the neighbourhood of the exhibition a weaving school, with looms, which need merely be mentioned here.

One department of the Exhibition, which in its foundation was incorporated with it, has for some time ceased to exist; this is the department for the exhibition of the industrial products of Wurtemberg.

This was intended to make foreign merchants acquainted with the home manufactures, and to promote their sale. Native manufactures were not allowed admittance, in order, as far as possible, to protect the exhibitor from the imitation of new fabrics by competitors.

Against all expectation, this department did not attain the desired aim.

The Royal Department for industry and commerce possesses a yearly revenue of 90,000 florins, of which 30,000 florins are annually expended in acquisitions for the Exhibition.

This is open on working days and holidays, from 10 to 12 o'clock in the morning, and from 2 to 6 o'clock in the afternoon. All persons who visit it for the purposes of their trade, and who will enter their names in a book placed for that purpose, have free admittance, Others pay 6 kreutz entrance. On Sundays, from 10½ till 12½ o'clock admittance is free without exception.

The loan of patterns and of articles in the industrial art collection was particularly mentioned at Stuttgart, and pointed out as being especially advantageous. The regulations concerning the loans are subjoined.

That the influence of the Exhibition is most salutary, as also that it has effected a decided progress in the industry of Wurtemberg, all the manufacturers of the country would no doubt unanimously admit how extensively it is made use of, is to be seen from the fact that a third part of the collections is lent out, at one time, and serves for the thorough instruction of the workmen. Let us reflect, how long it often is before a small manufacturer (and it is exactly this numerous class of persons which needs support), can be made acquainted with new technical improvements and can get to see them; how long he continues to work with forms of which the fashion has already become antiquated, and uses instruments which have long been replaced by more convenient ones, let us think how important any movement is to the manufacturer which furnishes him with new ideas, and how necessary it is in the present day for the success of even the most skilled workman that he should introduce novelties into the market, we can then imagine how grateful the hundreds of workpeople are to the Wurtemberg museum, which is of such service to them in their instruction and the promotion of their trades.

PRUSSIA. (See page 107.)

Superior Weaving School in Elberfeld.

(Translation.)

This school consists of three divisions:—

I. A division for instruction in the actual processes of weaving.

II. A division for pattern drawing.

III. A division for chemical instruction.

The object of the institution is—

1. In the first division, to introduce the pupils to the entire sphere (theoretical and practical) of the manufacture of textile fabrics, so as to enable them to undertake the independent management of a manufactory of this kind, or of an establishment trading in these fabrics.

2. In the second division, to form designers who shall be able to originate and draw patterns suitable for woven and printed goods of every description, and pattern card-makers *(patroniser)* who are able to arrange every pattern correctly on the cards; and, in addition to this, to afford thorough instruction in drawing to other young people, such as stone-carvers, engravers, lithographers, house-painters and decorators, &c., whose trades require it.

3. In the third division, to impart thorough theoretical and practical knowledge in technical chemistry to dyers, printers, colour manufacturers, manufacturers of chemicals, &c., and also to those who would qualify themselves as technical teachers.

The first division comprises two courses, one in analysis (*decomposition*), by which is understood the elements of weaving, a knowledge of the materials used, and of the arrangement of the machines; analysis of the modes of making patterns in plain fabrics, practical exercises in the various operations of weaving, the elements of Jacquard weaving, analysis of and mode of setting patterns for these fabrics, practical exercises connected with the Jacquard looms, free-hand drawing, painting, and modelling from nature.

The second course in composition comprises further instruction in the knowledge of the materials of weaving, and of all the processes connected with linen, cotton, woollen, and silk weaving; the choice and calculation of the quantity of yarn to be used for various materials with reference to the changes caused by dyeing and the loss sustained in weaving; calculation of the prices of materials for weaving; knowledge of the composition of all kinds of textile fabrics, from the simplest to the most complicated, and of all the technical and artistic processes connected with their production; calculation of the special items and of the entire cost of the fabrics; and practical exercises in all the details of the preparation of weaving with all the different kinds of looms, and in the composition of designs, patterns, &c.

Each course comprises two divisions, a lower and a higher.

Both courses begin twice a year; the duration of the entire course of instruction is one year and a half, the analytical (*decompositions*) course extending over one year, and the composition course over half a year. Pupils who wish only to take part in the latter, must prove that they possess the requisite knowledge of analysis. The number of hours in each division is 36 a week, and the practical exercises in the workshops take place from 8 to 12 A.M., and from 2 to 7 P.M. The fee for the entire course is 120 thalers; for the analytical course alone 90 thalers. The pupils of this division may attend the lectures on

chemistry and physics in the chemical division without further payment.

Division II comprises free-hand drawing and painting, first from models, afterwards from natural objects, such as plants, flowers, vases, &c.; knowledge of the colours used in manufactures and the mode of applying them; composition of patterns, and knowledge of and practical exercise in pattern making from textile fabrics, drawings, &c.

This course, also divided into two sections, likewise commences twice a year. The number of lessons weekly is 24, the annual fee 30 thalers.

A special early morning and evening course exists for the accommodation of scholars who are prevented by their avocations from attending the regular classes. The number of hours a week is eight, and the fee 20 silver-groschen per month (about 2*s.*).

Division III comprises a course for practical chemists in general, and another for dyers, printers, bleachers, colour manufacturers, and manufacturers of chemicals specially.

The instruction given in the first course embraces:—

1. *Inorganic Chemistry.*—Connexion between chemistry and the other branches of natural science. The objects to be accomplished by chemistry. The progressive development of chemistry. Full course of inorganic chemistry. Stocchiometry.

A large collection of specimens and constant experiments assist the pupils in understanding the lectures. 4 hours weekly.

2. *Knowledge of Chemical Substances (Droguen).*—Inorganic chemicals. Particular inorganic substances (such as sulphurous acid, soda, chlorine, &c.) of particular importance to technical chemists are selected and specially and thoroughly discussed. Visits to manufactories, examination of the chemicals belonging to the school, and practical exercises further complete the lessons.

3. *Analysis.*—Quantitative and qualitative analysis extended to all substances that are of importance to technical chemists, the qualitative analysis being carried on by all the pupils in the same way, but the processes of quantitative analysis being taught to each pupil in the manner best suited for his future calling. Particular attention is given to trituration (*Tritiren*). 2 hours weekly.

4. *Physics.*—Those parts of this science which are specially important to the industrials concerned are fully treated, and are elucidated by experiments. 2 hours weekly.

The subjects of instruction in the second course, are:

1. *Knowledge of Dyes and Colours.*—As a thorough knowledge of dye stuffs is an essential condition for successfully carrying on dyeing and printing works, inasmuch as the methods used by the dyers and printers are dependent on the nature of the colouring stuffs, special lectures are devoted to these substances, the collection of materials is studied, and practical exercises gone through. 6 hours weekly.

2. *Analysis.*—Continuation of general analysis, and special analysis of dye stuffs. 2 hours weekly.

3. *Physics.*—Continuation of first course. 2 hours.

4. *Theory of Dyeing.*—Chemical and physical consideration of raw materials (cotton, linen, wool and silks). Analysis of simple and mixed stuffs, preparation of the yarns for dyeing (bleaching of cotton and linen yarn, removing the greasiness of woollen textures, scouring silk). Influence of the reactionary agents (air, light, heat). Relation of vegetable and animal fibres to dyeing stuffs. Substantive colours. Abjective colours. Theory of tanning (*Beize*). Tanning stuffs. Choice of

dressing for printed goods. Influence of this on the shades of colour. &c. Glazing (chemical and mechanical arrangements).

All matters touched upon in the lectures are elucidated by experiment, and, indeed, one of the chief objects held in view is that the pupils should practice in dyeing and colouring laboratory on all kinds of yarns and textures. Lectures, 6 hours per week.

5. Analysis of coloured stuffs. 2 hours weekly.

Each of the courses is divided into a summer and winter course, and is completed in a year. Dyers, printers, &c., who are not sufficiently well acquainted with the subjects of instruction comprised in the first course, to be able to begin at once with the second, must attend both, and for them the period of instruction will thus be two years. For other technical pursuits the first course suffices, and the period of instruction is, therefore, one year only.

The fee for attending the lectures alone is 20 thalers for the half year; for participation in the work in the laboratory, 40 thalers additional for the half-year, or 25 thalers for working half-time. Pupils do not, however, pay anything extra for gas or for the materials used.

The institution possesses a large collection of every kind of machinery and implements connected with weaving, of specimens of ancient as well as modern tissues, both of home and foreign manufactures, and of drawings, engravings, models, compositions, in the most varied forms, are all for the use of the scholars.

Superior Weaving School in Crefeld.

Also intended to educate for their vocation, master manufacturers, foremen, and designers, imparts instruction in the same branches of weaving and drawing as the Elberfeld school, but does not include the chemical division for dyers, bleachers, &c. The fee for a course of one year is 40 thalers, and the implements used are paid for by the pupils. The patterns for analysis (decomposition) are provided gratis by the school.

Royal Prussian Academy for Political and Rural Economy at Eldena, near Griefswald (Pommerania).

(Translation.)

This academy, which was opened in the year 1835, was in 1850 placed under the authority of the Ministry of Rural Affairs, but remains as before, a branch of the University of Greifswald, organically connected with the scientific life of the latter.

The subjects of study are the same as those of the Academy of Poppelsdorf of which the details are subjoined. The course extends over two years. The students must matriculate at the University of Griefswald but only bind themselves for one semester.

Similar institutions with almost identical plans of study exist at Proskan, near Oppeln, in Silesia, opened in 1847, and having up to 1866 been attended by 1067 students. The plan of studies is almost identical with that of the academy of Poppelsdorf. The so-called *praktikanten station* connected with the academy Proschkan afford an opportunity for young farmers to obtain thorough knowledge of the

practical part of their vocation, in which they receive instruction from the administrator of Proskan, and the inspector of farms at Schimmitz, in whose houses they are received as boaders.

In Waldan, near Königsberg, open 1858.

In Berlin, in connection with the university there.

In Halle, in connection with the university there, and under the authority of the university of religion and medical affairs. A veterinary hospital connected with this institution is being rebuilt, the land devoted to experiments is being extended, and a rural zoological garden is being organized.

At Neustadt Eberswald, in the province of Brandenburg, there is a superior school for matters connected with the management of forests, which is under the authority of the Minister of Finance.

The subjects of study are:—The cultivation of woods and forests, forest taxation, commutation of forest services, political economy in general, and with special application to the administration of forests; history and literature of forest management, knowledge of game-keeping, natural sciences in general, general botany, forest botany, the anatomy of plants, general entomology, special knowledge of forest insects, natural history of vertebrate animals in general, and of birds in especial; arithmetic and analysis with reference to matters occurring in the management of forests, geometry and trigonometry for the purposes of practical surveying, the mathematical principles of road-making, stereometry and mathematical geography, plan drawing, mechanical physics, the forms of Prussian forest measurement, civil law, with reference to the administration of forests and game, the protection and the police of forests; chemistry, mineralogy, dynamical physics, and the physiology of plants.

Two days a week are devoted to practical studies in the forests belonging to the institution, and in summer excursions are made daily for scientific studies, and practice surveying, levelling. The course extends over two years, admission is not granted to persons above twenty-five years of age, and a certificate of having attained the necessary preliminary knowledge at a gymnasium or a *real* school.

In Berlin there is a Royal Veterinary School.

In addition to these agricultural high schools, there are in every province of Prussia inferior agricultural schools, amounting together in 1867 to twenty-one. They differ in their scope and organization, in the number of pupils admitted, and in the amount of honorarium demanded, but in all a practical and thoretical agricultural education is combined. Among the number is the Royal Agricultural School at Annaberg, near Bonn, of which the statutes are subjoined.

§ I.

The object of the institution is to educate young men belonging to the class of small farmers to become thoroughly trained peasant farmers, and experienced bailiffs.

§ II. *Mode and Extent of Instruction.*

The instruction is carefully calculated for the future calling of the pupils. This demands insight into the principles of rural labours, practical skill, and personal activity. It is, therefore, of importance to make the pupils acquainted with a well-organized farming business, and more particularly to explain to them the necessary internal connection of the several branches of the business, as also the reasons for the execution of the several kinds of work.

The pupils must next put their own hand to all the different works

in yard, garden, field, meadow, and wood, and obtain sufficient skill in these to enable them to apply their knowledge usefully and satisfactorily in their future sphere of activity.

The instruction is thus first and foremost practical, a fixed plan being adopted for the gradual perfection of each pupil in the various occupations of a farm. They are thus alternately occupied in preparing food for, and tending the cattle, in preparing and distributing manure, in the garden, and in the orchard, in the barn, and in the fruit storehouse, in tilling the fields, in sowing and reaping them, in meadow work, drainage work, &c.

The theoretical instruction is also strictly adapted, as to form and extent, to the mental faculties and the future requirements of the pupils.

In summer it consists mainly of explanations and elucidations connected with the practical work.

In the winter, on the contrary, several hours daily are devoted to consecutive scientific studies. These studies comprise the leading principles of natural science, of the special sciences applying to agriculture, and of veterinary, the lessons being based on popular handbooks. In addition to this exercising lessons are given in the elementary branches of education bearing upon farming business, as for instance, sums in arithmetic having reference to the affairs of daily life, calculations of revenues of farming, writing of receipts, agreements, simple reports, &c.

§ 3. *Means of Instruction.*

The royal domain of Annaberg serves as a field for the practical instruction. The principles on which this farm is carried on aim at obtaining a high, lasting, net revenue. Every luxury in the arrangements, which would require extraordinary means, is avoided, and only such improvements in modern farming are introduced as have been proved to be really useful. The estate is regularly surveyed, and the variety of the lands and soils affords excellent opportunity for instruction in different kinds of culture. The whole is based upon a regular farming plan. The breaking in of waste lands, the drainage works, and the meadow culture, deserve special mention. With the farm is further connected extensive cultivation of fruit and vegetables, and a nursery for fruit trees.

Besides its own practical means of instruction the institution enjoys the use of the rich collections and apparatus of the Academy of Poppelsdorf.

§ 4. *Duration of Course of Instruction.*

The course of instruction is fixed to last one year, and can only, in exceptional cases, be extended beyond this. Pupils cannot be allowed to leave the school within the year, except under very pressing circumstances.

§ 5. *Number of Scholars and Conditions of Admission.*

The normal number of scholars is temporarily fixed at 6.

Only sons of small farmers can be admitted as pupils. On entering they must—

1. Be above and under 25 years of age.
2. Be provided with a certificate of good conduct, having attended school, of baptism, and of place to which they belong.
3. Must possess sufficient mental capacity and preliminary knowledge to enable them to understand a popular lecture on farming and the auxiliary sciences.

4. Must possess the health and bodily strength and development required for agricultural work; and,

5. Must have a certain amount of practice in handling the various implements.

§ 6. *Directors and Teachers.*

The agricultural school is under the guidance of the director of the agricultural academy of Poppelsdorf, but has a special inspector. Upon the latter devolves the duty of watching over the pupils, and directing the practical work, and the instruction in farming. The auxiliary branches are undertaken by masters belonging to the academy. The exercises in the elementary branches are carried on under the guidance of the village schoolmaster.

§ 7. *Keep, &c., of the Pupils.*

The pupils receive instruction, board, lodging, light, heat, laundry, gratis, but they are bound to execute the work on the farm without remuneration. Those who show persevering industry, and commendable skill may, however, receive, on the recommendation of the director, a reward of from 10 to 20 thalers, on completion of the course.

§ 8. *Domestic Life.*

The mode of life of the pupils is strictly adapted to their position, and to the circumstances in which they will be placed on leaving, in order that they may acquire no unnecessary wants which it may be impossible for them to satisfy afterwards. They are, therefore, made to attend strictly to order, cleanliness, frugality, obedience, and moral conduct. Their food is that of simple peasants, and is partaken of at the table of the estate bailiff. They must brush their own clothes, and their shoes.

§ 9. *Supplementary matters.*

Clothes, body linen, and materials required for the lessons, such as paper, pens, ink, books, &c., must be provided by the pupils themselves. But the institution furnishes their bed-rooms and sitting-room, as well as the school-room.

§ 10. *Cases of Illness.*

In cases of serious or protracted illness the parents of the pupils must bear the expense of doctor, medicine, and nursing; but the parents have the right, if the nature of the illness will admit of it, to have the patient removed from the school until his recovery.

§ 11. *Discipline.*

The pupils are bound to adhere strictly to the rules of the home and the school.

Disobedience, laziness, immoral conduct, or any other offence, must, according to its gravity, be punished, either by exhortation, by reprimand before the assembled scholars, or by expulsion from the school. The pupils are also bound to make good any injury they may, through mischievousness, gross carelessness, or evil intention, cause to the cattle, the implements, &c.

§ 12. *Leave of Absence.*

There are no fixed vacations during the year, but in winter pupils, who have given great satisfaction, may, as a reward, be allowed a few days' leave of absence.

§ 13. *Examination.*

At the close of each school year a public examination is held, which is applied to the skill in practical work, as well as to the extent of scientific knowledge. The directors of the Agricultural Society of Rhenish Prussia are invited to be present at these examinations.

§ 14. *Certificates.*

On leaving the school, each pupil obtains a certificate of conduct and of knowledge in accordance with the results of the examination.

§ 15. *Superintendence.*

The Agricultural School is a State establishment, and as such comes in all matters within the authority of the Minister of Agriculture.

In addition to the schools of general agriculture and rural economy there are throughout Prussia numerous schools for special branches, such as the cultivation of flax, of tobacco, of madder, of meadow lands, of bees, of silk-worms, &c.; also schools of horticulture, vegetable and fruit-culture, and numerous schools for the management of forests.

Royal Prussian Agricultural Academy at Poppelsdorf.

The object of this academy is: I. To afford an opportunity to young farmers who have a certain amount of preliminary, scientific, and general knowledge, and who are skilled in handling the implements of their calling to make themselves acquainted with the sciences specially applicable to agriculture, as also the auxiliary sciences, in as far as is required for the rational farming and administration of a landed estate in the present day; and, II. To offer to students of jurisprudence and of political science, as well as to all others whose future vocation may render some acquaintance with the rational mode of conducting an agricultural business useful (though they may not intend to become practical farmers), the means of learning to know the theoretical as well as the practical principles of such a business, and to acquire a distinct notion of its organization and the mode of conducting it.

The aim of the Academy is thus not only to educate men to be thoroughly capable of conducting the business of larger or smaller estates, whether as proprietors, farmers, or land stewards, but also to enable future officials in the administrative departments of Government, who may require more than a superficial knowledge of rural economy, to obtain this.

The plan of studies in the Academy is as follows:—

A Survey of the Subjects taught.

Preliminary Agricultural Studies.

I. *Agricultural Training.*

A. The study of agriculture.

1. Knowledge of the soil.
2. Study of manures.
3. Clearing, draining, and distribution of land.
4. The knowledge of agricultural implements and machines.
5. The cultivation of grain and fodder.

6. The cultivation of materials for manufacture.
7. The cultivation of grass-lands.
8. The cultivation of vines and vegetables.
9. The raising of fruit trees.

B. The study of the rearing of animals.
1. General cattle breeding.
2. The treatment of horned cattle.
3. Horse-breeding and other matters relating to horses.
4. Sheep-breeding and the knowledge of wools.
5. Rearing smaller animals.
6. The sanitary treatment of domestic animals.

C. Theory of farming.
1. Connection between rural economy and political economy.
2. Systems of farming, the management of large estates, and laying down plans of farming.
3. Valuation of land, and instruction in making estimates of productions.
4. Agricultural bookkeeping.
5. Agricultural accounts.

D. History of agriculture.
1. History and statistics of agriculture.
2. The literature of agriculture, with special reference to the newest publications.
3. Comparison of the condition of agriculture in the principal countries of Europe, particularly England, with special reference to Germany.

II. *Forest Economy.*

1. Forest culture.
2. The use and protection of forests, and estimates of their productions.
3. Hunting and fishing.

III. *Natural Sciences.*

1. Inorganic chemistry.
2. Organic experimental chemistry.
3. Analytical chemistry, with practical working in the laboratory.
4. Chemistry of soils.
5. Animal chemistry.
6. Agricultural chemical literature.
7. Experimental physics.
   a. Statics and dynamics.
   b. Science of heat and meteorolgy.
   c. Electricity, magnetism, sound, and light.
8. Mineralogy and geognosy.
9. Botany in general, and the anatomy of plants.
10. Physiology of plants.
11. Agricultural botany and the diseases of plants.
12. Selections from general botany, and from the anatomy and physiology of plants.
13. The practical working of the microscope, and experiments in the physiology of plants.
14. Anatomical, physiological survey of the animal kingdom.
15. The natural history of invertebrate animals.
16. The natural history of vertebrate animals.
17. Repetitions in natural philosophy.

IV. *Mathematical Sciences.*

1. Practical geometry and exercises in surveying and levelling.
2. Agricultural mechanics, and the theory of machinery.

V. *Political Economy.*

1. The principles of national economy.
2. Political economy.

VI. *Jurisprudence.*

1. Introduction to the laws respecting agriculture.
2. Agricultural law.
3. Agrarian legislation (*Agrar Gesetzgebung*).

VII. *Veterinary Science.*

1. Anatomy and physiology of domestic animals.
2. Acute and contagious disorders of domestic animals.
3. External diseases of domestic animals.
4. Shoeing and tending.

VIII. *Technology.*

1. General technology.
2. Technology of branches of industry connected with farming.

IX. *Architecture.*

1. Knowledge of building materials and theory of architecture.
2. Construction and arrangement of farm buildings, and buildings for collateral industrial undertakings.
3. Construction of roads and canals.
4. Exercises in drawing.

Instruction Comprised in the Different Branches of Study.

Introduction to Agricultural Studies.

The object of the preliminary lectures is to show the importance of agricultural pursuits in general, the necessity of a scientific training to direct them, the extent of agricultural science, embracing the special fundamental and auxiliary sciences bearing upon it, and the importance of the several branches of study with respect to the general culture of the farmer; also the mutual relations of the various subjects of instruction. Lastly, advice is given as to the most suitable method of study.

I. *Branches of Study connected with Farming.*

A. Agriculture.

1. Knowledge of the soil:

Upper stratum of the earth. Atmospheric action of constituents of the earth. The influence of mountain formations on the composition and fertility of the soil. Physical properties of the soil. The classification of soils. The distribution of soils. Sub-soil and surface soil.

2. Study of manures:

Principles governing the nourishment of plants. The difference between wild and cultivated plants. Stable manure. Combination of the different animal manures, with stable litter. Treatment of manure in the stable, the yard, and the field. Liquid manure, litter, nightsoil, other animal, vegetable, and mineral manures. Economic importance

and use of the same. Different processes for preparing manures for sale, and different methods of applying them.

3. Clearing, draining, and working the land.

The most important process of tillage; different modes of culture required for woods, heaths, moors, and sandy places.

Evils of dampness. Different methods of draining, more particularly by underground drains. Draining combined with practical demonstrations; cost and results.

Various objects and various methods of tillage, deep soil culture, fallows. Different methods of cropping, change of crops. Rules to be followed in sowing, reaping, and storing produce.

4. The knowledge of agricultural implements and machines.

The importance of agricultural implements and machines. Materials used in their construction.

Implements for working the ground; hand tools; horse machines; the plough. (The importance and history of the plough; what is expected from it.) The work of the plough. Theory of the plough. Its different parts. Classification of ploughs. Judgment of the different kinds of ploughs with reference to the uses they are to be put to. The extirpator, the scarifier, horse chopper, harrow, drag, roller.

Sowing machine system; machines for broadcast, drill and dibble sowing. Criticism of the methods most in use. Machines for spreading manure. Machines for pulverizing manure. Machines for liquid manure.

Various reaping machines, machines for mowing corn, grass mowing machine, horse rakes, haymaking machines, potato-digging machines.

System of threshing by machinery; hand winch, and steam threshing machines.

Criticism of the most important.

Machines for cleaning grain (cleansing and sorting machines).

Groat, flour, and crushing mills, and oilcake crushers.

Chopping machines and root cutters.

Other machines and implements, pumps and hydraulic engines. Machines for making drainage pipes. Winchwork. Implements of transport (carts, waggons, sledges).

5. The cultivation of grain and fodder:

The special culture required for each plant; requirements as to climate and soil.

Succession of crops; preparation and manuring of fields; arrangement; care during vegetation, harvesting, storing, and transport.

6. The cultivation of materials for manufacture:

The special culture of each plant as in No. 5.

The lectures on the cultivation of special plants will be elucidated by practical demonstrations on the farms of Popplesdorf and Annaberg.

7. The cultivation of grass lands:

Examination of the different modes of culture, distribution of meadow land.

The forming of meadows by sowing.

The treatment of meadows which cannot be irrigated. Clearing, levelling, manuring, breaking up or draining: forming of water meadows, advantages of irrigation, implements used in the cultivation of meadows, trenching; other operations connected with the artificial treatment of meadows, flooding, aqueducts, special methods of irrigation, overflooding, the Peterson system, making valuations, the care and keeping up of artificial meadows.

8. The cultivation of vines and vegetables:

a. The cultivation of grape-vines; on the nature of the grape. The places in which it is indigenous; the climatic requirements; the propagation and improvement of vines; making and working vineyards; different methods of production; treatment and cultivation; quantity and quality produced; the diseases of grape-vines.

b. The importance of the cultivation of vegetables, where there are accessible markets. The laying out of the vegetable garden. The cultivation of vegetables on sound principles, with special reference to the kinds of vegetables suited for country populations, and for sale in large quantities.

9. The cultivation of fruit trees:

Principal facts in the history of fruit culture. Knowledge of fruit culture, with demonstrations. The choice of the best and most useful varieties. Their requirements as to climate, situation, and soil. The raising of fruit trees, with demonstrations. The laying out and management of nurseries for fruit trees. The planting, division, and management of the improving orchards. Improvement of the quality of fruit trees. The theory and modes of proceeding as to different methods of grafting, with practice. Rearing, cutting, and shaping the grafted tree. Fruit tree plantations, mode of planting and tending them. The diseases of fruit trees. The use and storing of different fruits. The profits derived from fruit culture.

B. The study of cattle breeding:

1. The general rearing of animals. Relations of cattle breeding to agriculture. Importance of this at the present time. The fundamental principles of cattle breeding, &c. The art of breeding; the origin of races; artificial and natural races. Technical expressions; breeding; descent; influence of both sexes on the breed. Influence of parentage; individual influence, cross beeeds, thorough breeds. The school of Buffon. Breeding in and in. Different methods of crossing. Darwin "On the Origin of Species." Instruction as to feeding. Different kinds of food and their constituent parts. Effects of different kinds of food. The natural inclinations of domestic animals with respect to different kinds of food. The volume of food. The amount of water contained in the fodder. The relation of protein to hydro-carbon. The effects of fat. Preparation of food. Salt as an ingredient of diet. Mixed fodders. Rules for determining the amount of nourishment in different kinds of food. Of the individual kinds of fodder. Matters to be taken into consideration in determining the quantity of food. Mode of estimating the quantity. Quantities to be given for substance, for fattening, and for diminishing fat.

The further care of domestic animals. The allotment of food for stated meal times. Change of food. Drinks. Temperature of the stables. Air, light, exercise, treatment in other respects.

2. The breeding of horned cattle:

Importance of breeding horned cattle. Points in natural history. Breeds of oxen, the English breed in particular.

Breeding, choice of breed, method of breeding, choice of individuals for breeding. The relation between bodily form and usefulness in various respects. Rearing of calves.

Feeding and tending full-grown cattle:

General principles on which cattle should be fed. Amount of food required. Summer stall feeding. Pasturing, a mixture of the two. Winter food. Alternation of fodder. The stable arrangements. Persons tending the cattle.

Employment of cattle on a farm:

The dairy. Chemical and other properties of milk. Testing milk.

Matters that influence the quantity and quality of milk. The making of butter and cheese. *Fattening*—Choice of stock for fattening. The process of fattening calves. The meat market. Classification of meat. The purchase of fat beasts. The use of oxen for labour. Choice as to breeding or purchasing.

3. Horse breeding and knowledge of the external parts of horses. *Horse breeding.*—Its importance. Natural history. Principal races of horses. Choice for the various purposes of breeding. Pairing. Keeping and tending stallions and mares. Tending of and feeding foals. The most important diseases incident to foals. A knowledge of the external parts of horses. Bodily structure of the horse. The relation of one part to the other. Differences of form and development with reference to the various services for which the horses are destined. Paces. Age of teething. Precautions to be observed in purchasing horses. Practical demonstrations.

4. Rearing sheep and the knowledge of wools:

(*a*). Sheep breeding, importance of breed. Natural history. Breeds of sheep. The history of merinos. Breeding, right method of breeding. Choice of direction of breeding. Process of breeding. Choice of stock for breeding. Register of breedings. Pairing. Lambing. Keeping of lambs and ewes.

The nourishing and tending of the full-grown animals. General principles as to the nourishment of sheep. Amount of food required. Stall feeding. The two methods combined. Winter fodder. The preparation of food. The choice of food. Persons attending the sheep. Arrangement of the folds. Utensils for holding food.

Treatment and sale of produce. The uses of wool. Washing. Shearing. The sale of wool. Use of the milk. Separating the sound animal from the unsound. The sale of fatted beasts. Sale of sheep for breeding.

The use of sheep on the farm. Principles of different modes of sheep farming. Composition of flocks. Calculation of the cost and profit of different modes of sheep farming.

6. The knowledge of wool:

Of wool in general. Technical preparation of wool. Cloth wool and carding wool.

Special properties of wool. Fineness, curl, softness, strength of fibre, elasticity, length, colour, gloss, oiliness.

Wool in staple and fleece; quality of staple. Thickness of the wool; outward form of the staple. Inward construction of the staple. Shortness, evenness. Matters to be observed in judging of the yield of the wool.

5. Rearing of smaller animals:

(*a.*) Rearing pigs. Importance of rearing pigs. Natural history. Breeds of pigs.

Breeding. Selection of breeds. Process of breeding. Choice of individuals for breeding. Register of breeds. Birth. Care of the litter.

The feeding of pigs. General principles of feeding. Amount of food required. Alternation of food. Gradual process of fattening. Sale of the fatted animals.

(*b.*) The rearing of domestic poultry. Knowledge of races, breeding, feeding, and tending. Different plans of managements.

Sanitary matters connected with the treatment of domestic animals.—General external influences which affect the bodily condition and health of animals, and the amount and quality of the animal; product more particularly.

(*a.*) Atmospheric influences affecting respiration, the developing heat, and the functions of the skin. Heat and cold, moisture, crowding, exercise, light, &c.

(*b.*) Food and drink. General character of these. Their relation to the organs of digestion, and the different purposes of feeding. Amount of food to be given. Preparation of food, &c.

(*c.*) Tending and care, housing.

(*d.*) Theory of farming. Principles of political economy involved in rural economy. Object of rural economy: land and soil, and their adaptability for different modes of culture. Position of the different classes of agricultural labourers. Work done by horses. Choice of cattle for draft. Number of labourers required. Application of machinery. Capital, its distribution. Productivity of the capital invested in the various branches. Relative proportion of these sums to each other, to the land worked. Sale of products. Character, size, and distance of the market town. Influence of trade relations on the entire business of the farm. *The Farmer*—His education. Administration of the estate by the proprietor. Letting to a farmer. Conduct of large and small farms. The relation of industry to agriculture. Agricultural associations and means for taking credit.

2. Farming systems. The management of large estates, and the preparation for carrying out plans for working.

Nature of objects aimed at in the management of an estate. Different systems of farming and different rules of rotation. Critical examination of the same. The conditions on which they can be profitably carried on. Parceling out of fields. Diffusion of the established systems and alterations introduced by progressive civilization. Change to a new system and new rotations. Choice of collateral branches of business in connection with the farm. Conduct of the business. Persons engaged in the management. Their duties and position. Choice and acquisition of estate by purchase or on lease. Agreements for purchasing and taking leases. Founding new estates. Instructions for laying out a farm.

3. Valuation of land and instruction in making estimates of productions.

Meaning and object of valuation. Different reasons for valuation.

Principles of valuation. Improvements. Different methods of classification. Estimate of gross revenue derived from the various branches, and from the entire outlay on the estate. Estimate of net profits. Estimate of the capital value. Special and general valuation. Practical instructions for making estimates of revenue.

4. Agricultural bookkeeping.

As a guide to the lectures, treating of the importance, the principles, and the method of the improved system of keeping agricultural accounts, the director, Dr. Harstein's work on the subject shall be used, and for practical exercise the pupils shall make out a year's accounts of the Poppelsdorf estste, according to the system of double entry.

5. Agricultural calculations.

These lectures, which are illustrated by examples, treat of the solution of manifold questions connected with the administration of landed property by means of arithmetical formulas. For instance, calculation of the cost of production of, and of profits which ought to be realized on, various agricultural products; proofs of the advantages of various operations, such as the use of particular machines, of new methods of cultivation, of the technical manipulation of products, &c.

D. History of agriculture.

1. History and statistics of agriculture.

History of the gradual development of agriculture, especially in Germany. Sketch of the present state of agriculture as shown by official statistics. The condition of Germany will hold a prominent place with regard to this branch of the subject also.

2. Literature of agriculture with special mention of the newest publications. The gradual development of agricultural literature as shown by the leading ancient works on the subject. Critical examination of the most important modern works on agricultural subjects.

3. Comparative statement of the condition of agriculture in the principal European countries with particular reference to England and Germany.

Comparative account as above, taking into account the natural conditions of the various countries, their means of communication, &c., with a view to affording German agriculturists a clear understanding of their own position in relation to those of other countries, and of the advantages and deficiencies of German agriculture.

II. *Forest Economy.*

1. Forest culture.

The importance of forest culture. Cursory view of forest botany. The artificial and natural first growths and after growths of the useful forest products, with practical demonstrations.

2. Forest industry, the protection of forests, and valuation.

A knowledge of the quality and proper use of different woods. The ingathering and improvement of forest products (forest technology). The transport and valuation of the useful produce of woods. Measures of protection with regard to the damage done to woods by men, hurtful beasts, and bad weather. Accounts of the produce of woods, and calculation of the net profit thence accruing from them, and of the consequent capital value of the woods. In these lectures particular notice will be taken of private woodlands, and the most important subjects relating to such, will be treated in detail.

3. Concerning hunting and fishing:

Division of subjects. History. Breeding of game. Preservation of game. Hunting, and proceeds of hunting. Formation, maintenance, and management of fish-ponds.

III. *Natural Philosophy.*

1. Inorganic experimental chemistry:

Introduction. Properties of simple bodies. Laws of chemical combinations and decomposition. Description and conditions of compound inorganic substances. The whole department of inorganic chemistry will be discussed in these lectures, and illustrated by experiments, a deeper study being devoted more especially to those elements and their combinations, which are of special importance in the economy of nature, and which play a prominent part in agriculture.

2. Organic experimental chemistry:

Introduction. Special character of organic combination. Substances of immediate and mediate organic origin, among the first, hydro-carbon, vegetable acids, fatty substances, substances containing nitrogen, &c.; among the second, alcohols, ethers, the products of dry distillation, &c. The extent of the instruction given on these subjects will be in proportion to their importance with regard to the vital processes of plants and animals. The lectures will be illustrated by experiments.

3. Analytical chemistry, with practical exercises in the laboratory.

Introductory lectures on analytical chemistry. The students receive, first, instruction in qualitative examination of minerals, vegetable ashes, soils, manures, &c.; and afterwards in quantitative analysis, for which the chemical laboratory has every requisite. Participation in practical work will only be allowed to those who have gone through previous study of inorganic chemistry.

4. Chemistry of soils:

General survey of the process of chemical decomposition of arable soils, both with respect to its mineral and its organic constituents. The chemical theory of the exhaustion of soils, and of manures. These lessons are completed by lectures on the practical knowledge of soils.

5. Animal chemistry:

Chemical principles of the process of animal nutrition, and of change of substances. A critical examination of the most important experiments in feeding characteristics of the animal substances most important in practical life.

6. Literature of agricultural chemistry:

History of agricultural chemistry. A survey and criticism of the most important works of ancient as well as modern literature bearing upon this science. A detailed repetition of selected chapters on the subject of theoretical chemistry.

7. Experimental physics:

(*a.*) Statics and dynamics. Introductory lecture. General properties of matter. Laws governing the equilibrium and motion of solids, liquid, and aeriform bodies. The phenomena of diffusion and endosmose.

(*b.*) Science of heat and meterology. On conducted and radiated heat. The most important effects of heat. Expansion of bodies, alterations of the state of aggregation. Elasticity of steam. Detailed descriptions and illustrations of the steam-engine. Influence of heat on climatic changes. Origin and metamorphosis of the atmospheric precipitates (*Niederschläge*).

c. Electricity, magnetism, sound and light. General physical theory of the laws governing the powers of nature. Explanation of their natural action (Northern lights, tempests, their effects on vegetation, &c.) and their applications in practical life. Telegraphy, photography, &c. The course of lectures on physics will be illustrated by experiments.

Each of these three sections of physics will form a connected whole, so that the study can begin with either without much loss. Besides the first section on statics and dynamics will be taught in the lectures given during one half-year of the second year's course on agricultural machinery and mechanics.

8. Mineralogy and geology.

A brief sketch of geology.

Composition of the crust of the earth. Rock formations, their structure, position, and origin. Mountain formations, upheavings and sinking. Volcanic phenomena. The geological action of water (springs, erosion, and deposits caused by rivers, seas, and lakes). Characteristics of the most important sedimentary formations. Coal, peat, salt deposits, &c. History of the inorganic world. The characterists of minerals which constitute the chief ingredients of rocks, and the products of the decomposition of which form the soil. Minerals most important to miners and for techaical purposes.

9. Botany in general and the anatomy of plants.

Morphology. The outward form and anatomical characteristics of the organs of plants.

Principles of systemization. Characteristics of the classes, orders, and most important families of the vegetable kingdom, their habitual, anatomical, and morphological distinctions. Reference to the general principles of natural systemization.

The most important facts touching the geography of plants; limits within which plants are distributed over the earth; their natural habitation and their emigrations.

Palaontology of plants. Characteristics of the vegetation of various geological epochs.

10. Physiology of plants:

Detailed representation of the structure and functions of the organs of plants and of outward influences on vegetation (for instance, of nourishment taken in through roots and leaves, assimilation and course of the sap, transportation, the influence of light, of warmth, of air, of the soil, &c., on the vital process of plants, &c.).

11. Agricultural botany and the diseases of plants:

Monographic descriptions of all the agricultural plants and meadow grasses in Germany, their habits, germination, vegetation, and fructification. Reference to the relations of their physiological conditions, to their cultivation, country, history, and distribution of the several kinds of plants suited for cultivation. The lectures will be illustrated by demonstration on living plants, in the lecture-room and during excursions.

In the description of agricultural plants, their diseases, and what is noxious to them, will be touched upon; afterwards a general survey of the diseases of plants, and more especially of those caused by parasites, will be given.

12. Selected sections of general botany and vegetable anatomy and physiology:

The most important matters comprised in these departments will be specially dwelt upon, and the newest publications on these subjects will be mentioned, so as to enable the student to continue his studies in this direction.

13. Practical exercise in using the microscope, and experiments as to the physiology of plants:

a. Use of the Microscope. Introduction to the use of the microscope. Exhibition and preservation of microscopic preparations, and practice in microscopic investigations.—*b.* Introduction to experiments on plants. The student will have the opportunity of personally testing the most important questions in the physiology of plants. For example, the examination of transpiration, nourishment, the influence of light, of warmth, &c. Only those students who have heard the necessary preparatory lectures can take part in these microscopic and physiological experiments.

14. Anatomical physiological, survey of the animal kingdom:

The most important points bearing on the organization of the classes and orders of the animal kingdom. The influence of external and internal structure on the habits of life. General remarks on the processes of nutrition, respiration, and circulation, the action of the nerves and muscles, functions of the organs of sense and propagation. These lectures will be illustrated by numerous demonstrations.

15. Natural history of invertebrate animals.

The chief part of these lectures will treat of the natural history of insects important to the agriculturist and to the manager of forests; and that of bees and silkworms will be fully elucidated by demon-

stration. The rest of the lower classes of animals will be briefly treated of, and their relation to man specially touched upon.

16. Natural history of vertebrate animals.

Characteristics of mammalia of birds; of amphibious animals and of fish. Their chief anatomical and physiological features, with particular reference to the species useful or hurtful to man. Anatomical demonstrations.

17. Repetitions in natural philosophy.

During these repetitions, students, and more particularly those who have been unable to follow and complete the two years' course of instruction, will have an opportunity of gaining an encyclopædic insight into all the various branches of natural philosophy taught separately in the academy.

IV. *Mathematics.*

1. Practical geometry and exercises in measuring land and levelling. Theorems in practical geometry; their use in the art of measuring fields. Application of the latter to agriculture. Practical exercise in measuring fields (with measuring bars, cross discs, the surveyor's table, the compass, the theodolite), and in levelling.

2. Agricultural mechanics, and the study of machinery.

Laws of motion; natural powers; estimation of their strength, and working capacity; friction, solidity of bodies, mechanical powers, their application and combination as agricultural machinery.

Water pressure, motion of water (in rivers, canals, and conduits). Water power and water wheels.

Atmospheric pressure, and its practical application. Steam power and steam engines. Mills.

V. *Political Economy.*

1. The principles of national economy. Fundamental idea of property. Systems of national political economy. The characteristics of national wealth. Laws governing the production, the distribution, and the consumption of goods.

2. Political economy.

Relation of the state to the national wealth. Way and means of governing in order to obtain the maximum of national prosperity.

Administrative measures and regulations relative to the production, distribution, and consumption of goods.

VI. *Jurisprudence.*

1. Introduction to the laws respecting agriculture. A short view of the existing works on land in Germany. Explanations of the idea connected with the terms, person, things, action, agreement, &c. Laws concerning property, law of inheritance, law of entail, &c.

The lectures on the general principles of law will hold constantly in view the relation of these to agricultural law; and the very extensive subject will thus be limited and determined.

2. Agricultural law.

3. Agrarian legislation (*Agral Gesetzgebung*).

VII. *Veterinary Science.*

1. Anatomy and physiology of domestic animals.

These anatomical and physiological lectures, which are to be considered as laying the foundation of the knowledge of veterinary science, of sanitary science, of the laws of health as regards animals,

and of the breeding of animals, treat of these subjects in detail, and in connection with numerous demonstrations on living and dead animals.

2. Acute and contagious disorders of domestic animals.

This lecture treats of the most common internal diseases, and of all infectious and contagious complaints of animals, their classification according to the parts they affect (diseases affecting the organs of respiration and digestion, &c.), their causes and course. As the object is not to give profound veterinary knowledge, but rather to enable the farmer to recognize the first symptoms of illness, and so form a right judgment as to their danger, to treat slight illnesses himself, and, in urgent cases, when the veterinary surgeon cannot be obtained quickly, to apply the proper medical and surgical treatment; that part of therapeutics will be taught, more especially which has reference to the treatment of slight and acute diseases.

2. External diseases of domestic animals.

The most important External Diseases.—Their division according to the seat of the disease in the various parts of the body. In respect of these diseases, also their appearance, their usual course, their local and general importance, and their tendency to become hereditary, &c., will be taught more in detail than the therapeutical and surgical treatment of them. As far as possible, practical demonstrations will be added to scientific teaching. Besides this, practical exercise will be afforded by the performance of special slight operations, such as bleeding, cauterizing, &c.

4. Shoeing and tending.

a. Shoeing.—A short sketch of the anatomy and physiology of the hoof. The horse-shoe. Shoeing sound hoofs. Shoeing diseased hoofs. Shoeing in abnormal positions and for irregular paces. The lecture will be practically illustrated.

b. Tending.—All matters relating to the symptoms and treatment of female animals during bearing time.

VIII. *Technology.*

1. General technology.

Introduction. Study of materials for burning and lighting. Preparation of fuel. The technical importance and application of water. The manufacture of animal and vegetable fats, of weaving and spinning fibres. Clay, gypsum, and lime burning.

2. Technology of collateral branches of rural economy.

Importance, application, regulation, and management of allied industries, showing the most recent scientific and practical improvements; for instance, in the manufacture of starch and sugar, brewing, and distilling, the making of wine, the manufacture of vinegar, the preparation of bread, butter, and cheese.

Illustrations by experiments, drawings, models, and visits to manufactories.

IX. *Architecture.*

1. The choice of building materials and the art of building.

The knowledge of building materials, the mode of obtaining them, and rules for their selection. Descriptions of the most important building works, their valuation, and terms which ought to be paid for their construction.

2. Construction and arrangement of agricultural buildings and industrial establishments.

These lectures will be illustrated by drawings and models as well as by buildings already erected.

3. Construction of roads and canals.

Constructing and keeping up roads as well as the needful ditches, thoroughfares, and bridges. Constructions for protection against inundations and swamping; making of weirs and sluices.

4. Exercise in drawing.

The drawing of plans and of agricultural implements and machines and designs for agricultural buildings.

HAMBURG. (See page 5.)

Annual Report of the Public Trade and Building School from Easter, 1866, to Easter, 1867.

This school was founded by unanimous resolution of the Senate and the representatives of the citizens of Hamburg little more than two years ago.

The Trade School aims at offering to trade apprentices in particular an opportunity of acquiring the theoretical knowledge and the skill in drawing and modelling which is likely to be of use to them in their calling.

The subjects of instruction in the four classes of the school, which has gradually been extended, are—

Class 4. German language, arithmetic, free-hand drawing.

Class 3. German language, calculation of planes and solids, algebra, free-hand drawing, drawing with compasses.

Class 2. Themes on matters of business, geometry, free-hand drawing, drawing with compasses.

Class 1. Bookkeeping, natural philosophy, professional drawing for builders, cabinetmakers, ship-builders, metal workers, and artistic trades, composition of ornaments, modelling in clay.

In addition to these branches, instruction is given in the English language and in commercial arithmetic; and there are special free-hand drawing classes for young teachers, and for boys in general.

Classes 3 and 2 have respectively two divisions—3*b* and 3*a*, and 2*b* and 2*a*; and class 1 has as many divisions as there are subjects of instruction, parallel divisions being formed whenever the number of the scholars in a class make it necessary.

The courses of classes 4, 3*b*, 3*a*, 2*b*, and 2*a* are half-yearly.

The time for the lessons is mostly in the week-day evenings from 7 to 9, and on the Sunday mornings from 8 to 12; but on account of want of space some of the lessons are given from 5 to 7 in the afternoon—hours less convenient for apprentices. The iustruction in drawing for boys is given in three divisions, twice a week, from 1 to 3, 3 to 5, and 5 to 7 o'clock.

New scholars are admitted twice a year, and each one is placed in the class or division best suited for his preliminary knowledge; but deviation from the rules of attendance on the subjects of instructions in the appointed class, as also participation in the instruction given in some other class, are allowed, either when the attaining of a more thorough education in the particular branch of industry which the scholar has selected may thereby be secured, or when particular circumstances make exceptions necessary.

The school fee for classes 4, 3, and 2, is 7 marks and 8 shillings;

for class 1, 10 marks; and for the elementary drawing classes for boys, 5 marks, half-yearly.

The school for the building trades offers to artisans of this class such theoretical instruction, and such guidance in drawing and modelling as is necessary for the thorough understanding and skilful prosecution of their trades.

The subjects of instruction and the exercises in the three classes are:—

1. German language and composition of themes on business subjects.
2. Bookkeeping.
3. Arithmetic.
4. Natural philosophy.
5. Free-hand drawing (ornamental designing).
6. Linear drawing.
7. Descriptive geometry (theory of shadows, stone cutting, perspective).
8. Knowledge of building, theory of construction, estimates of costs, architectural drawing.
9. Modelling in wood and in clay.

The full course (comprising in each class 54 hours weekly) extends over three winter half-years, so that the scholar goes through one class in each half-year.

The school fee for each half-yearly course is 75 marks courant.

The introduction of the English language, of commercial arithmetic, and of ornamental designing for painters, lithographers, &c., into the course of introduction in the trade school took place during the year to which the present report refers, and so likewise the special drawing class for teachers, which met so much appreciation, that more than 70 young teachers at once availed themselves of the instruction given.

Ever since the first opening of the school in May, 1865, with 190 pupils, the number of the latter has been gradually increasing. In the summer half year of 1866 it amounted to 377, and in the winter half year to 579. Of these 258 attend during eight or more hours in the week. The number of apprentices who attend the school is 374, and to these must be added at present 43 journeymen.

The number of scholars in the Building Trades' School during the winter course ending March, 1867, was, in the first class, 17; in the second, 28; in the third, 46, or 91 in all. The total number during the preceding course amounted to 57.

Workmen's Educational Union in Hamburg.

The course of instruction in this institution—given in the week-day evenings from eight o'clock till half-past ten—includes German, French, and English, free-hand drawing and designing ornaments, writing, arithmetic, bookkeeping, algebra, geometry, calculation of planes and solids, physics, chemistry, and stenography, cutting out for tailors, gymnastics, and singing.

The Sunday instruction comprises drawing with compasses, delineation of furniture, mechanical designing, and modelling.

Prospectus of Jessen's Polytechnical Elementary School in Hamburg.

The object of this institution, founded in 1857 by the present Director of the Public Trades' School, Mr. O. Jessen, to afford an opportunity, more especially for youths who have already been confirmed, to acquire that amount of knowledge of mathematics and the natural sciences, as also that practical skill in drawing and surveying which is required for the successful prosecution of many trades, and the want of which knowledge acts detrimentally on the prospects of numerous young men. The institution, therefore, gives such instruction as will enable the pupils to pass at once into a polytechnic high school, as also to enter immediately upon some practical calling, such as that of a civil engineer, architect, mechanical engineer, manufacturer, chemist, surveyor, farmer, or military officer.

The plan of introduction embraces the subjects necessary for these purposes.

The Altona Sunday School.

This school was founded in 1801 for the purpose of instructing future handicraftsmen and artists in such sciences and arts which, at that time, could very rarely be acquired in the popular schools, in a degree sufficient to render them truly useful. The more, however, the popular schools were developed in the course of years, the more the Sunday school renounced its character of a *general* educational establishment; and pre-supposing its scholars to be in possession of a certain amount of previous knowledge, it has gradually come to be a preparatory technical school (*technische Vorbildungs-schule*) for future handicraftsmen and artists. And it has gone on prospering in its simple and unassuming manner, meeting not only with appreciation, but with ever-increasing support, and showing itself unremitting in its endeavours to keep pace with the requirements of industry and art.

Annual Report of the Lubeck Trade School from October, 1856 to October, 1866.

This school has been in existence 26 years, and during the year 1865–66 numbered 208 scholars. During the course 67 scholars left the school, 8 of these being journeymen who began their customary travels, while of the rest some were called away by the necessities of their business, and others remained away from indolence and want of perseverance.

Instruction is given during two hours daily, Sundays included. The school is divided into three regular classes and a preparatory class.

The subjects taught (in degrees adapted to the several classes) are:—Technical drawing and embossing, ornamental drawing, free-hand drawing, geometry, geometrical drawing, arithmetic, chemistry, physics, mechanics, technology, bookkeeping, and the German language.

The school is a private institution, supported by foundations and voluntary subscriptions, and also in a measure by the entrance fees (1 Reichsthaler, 26 shillings) paid by scholars on their admission.

The direction of the school is entrusted to a committee selected from among the members of an association which has ever since the

foundation of the school taken a warm interest in it, and who give their services gratuitously.

The present number of scholars is about 380, who, divided into 11 graduated classes, receive gratuitously on Sunday mornings instruction in free-hand, linear, and mechanical drawing.

It is contemplated to extend the instruction further (probably on week day evenings) to caligraphy, bookkeeping, and the mathematical, physical, and technological sciences, &c., but to cover the expenditure for this it will be necessary to demand a school fee, to be fixed as low as possible, until the institution shall be in a position to afford this instruction also gratuitously.

Prizes consisting of a larger and a smaller silver medal are once every year distributed among the most deserving scholars.

Report of the Provincial Trade School at Dantzig, from October, 1855, to 1859 (see page 21).

THE great development which technical science has received during a series of years has produced a phenomenon which would scarcely have been thought possible in earlier times; science and industry have joined hands in common endeavours for mutual improvement and advancement. Their closer relations had been prevented by arrogant exclusiveness on either side, until at length, as very often happens, common necessities and material interests drew them together.

Experience has taught those engaged in industrial undertakings that for the management of an extensive business, practice alone is not sufficient, they have learnt to see that mere routine and practical rule and method acquired in a merely mechanical manner, while the reasons for them remain unknown, cannot satisfy the demands now made on industry. Science alone can lead to a knowledge of many of the improved processes in the manufacture of various articles, of more general and extensive methods of fabrication, of the mode of perfecting machines, &c., all of which can no longer be dispensed with. A conviction of the truth of this view could not but force itself upon the most stiff-necked of the followers of the old ways when they saw themselves outsped by the adherents of progress.

Abstract science on her side had offered to her view a fertile field of examples in the manifold undertakings of the industrial world, it found an unlooked-for sphere for new applications which stirred up within her sources of new life, acted ennoblingly on the manufacturing classes, created a desire to extend beyond the boundaries of that which is merely useful, and upon the whole she has been unceasingly occupied in satisfying the expectations raised by her.

What blessed fruits have grown out of the mutual action of science and practical life can only be fully appreciated by those who have taken part in, or attentively watched, their mutual approach.

A change so intimately connected with the well-being of the people could not escape the notice of the state authorities, whose interest in the progress of trade is owing to the necessity they recognize of placing the people in a condition to compete with their neighbouring states, while there was still a possibility of doing so. As our different schools, in consequence of their entire organization, were incapable of educating technical men qualified to undertake the management of extensive industrial establishments, or to give to members of different trades such

an education as would enable them to carry on their business more intelligently than heretofore. Privy Councillor Beuth, to whom Prussian trade and industry owe so much, was induced to found the Royal Trade School in Berlin, as well as the preparatory provincial trade schools in connexion with it; although there is still room for improvement in the management of these schools, they were nevertheless conducted according to a well digested plan, and at their foundation their further development according to the requirements of industry seems to have been provided for.

We have to thank his Excellency Herr von der Heydt for the enlargement and reorganization of the existing establishments which he, with the assistance of Geheimrath Efstereich and Dr. Druchenmüller, formerly director of the Royal Trade School, had carried out in accordance with a plan drawn up with a deep insight into the subject, and well calculated to await with calmness the test of the severest criticism.

Nevertheless the trade schools have recently been subjected to many sharp attacks, the motives for which may have been partly worthy, partly unworthy, but on one point they all show a surprising accordance, namely, in the entire ignorance of the wants of the higher as well as the lower trades, and of what the trades schools ought to accomplish and have effected up to this time.

The purpose of the following pages is to give to that part of the public which is interested in the matter, an insight into the organization and the working of the provincial trade schools.

Abstract of the Regulations and Organization of the Trades Schools in Prussia.

From the circular addressed to the several royal provincial administrations.

The further development of the system of trade schools in Prussia has, during the last two years, been the subject of repeated discussions both in the Ministry of Commerce, Trade, and Public Works, and among other competent judges specially selected for the purpose.

The task of the royal trades institutions and that of the provincial trades schools is fundamentally the same, and only differs as to the extent of their field of action. The latter, like the former, are intended to furnish the future mechanic with theoretical and practical knowledge, while the Royal Trades Institution, as the highest technical educational establishment of the State, has for its aim to form technical proficients capable of undertaking the organization and management of manufactories on a large scale. The object of the provincial trade schools is to teach their trade to bricklayers, carpenters, to the sinkers of wells, millwrights, tanners, brewers, distillers, dyers, &c., as well as to foremen in factories. It follows from this that the application of theoretical knowledge to trades must also hold the foremost place in the provincial trade school, for the merely theoretical knowledge of mathematics and natural philosophy, can only be of slight use to practical men, and they should not be left to find out for themselves the possible applications of these sciences to industry. In founding new schools, and of the gradual transformation of the already existing provincial trade schools, care should therefore be taken to introduce the practical branches of instruction mentioned in the plan of organization alluded to above, namely, knowledge of machinery, practical exercises in chemistry, technology, and the art of building. But in order to make this instruc-

tion profitable, it is necessary that the teachers in the upper classes of the provincial trade schools should have a thorough knowledge of elementary mathematics, of general chemistry, and physics, and be skilful draftsmen.

The rules for the final examinations in the provincial trade schools are, with but slight modifications, the same as laid down in a conference held for that purpose by the directors of such institutions. They are to remain in force until the experience as to their results may induce the Minister of Commerce, Trade, and Public Works to make some alterations in them. As entrance into the Royal Trade Institution may be obtained by a certificate of examination testifying to the competence of the holder, an honourable motive is held out to the pupils of the provincial trade schools to endeavour to qualify themselves for the examination, while to those also who bring their theoretical studies to a close in the provincial trade schools the certificate of examination will be an important official testimony of their proficiency.

Abstract of the Plan for the Organization of the Provincial Trade School.

§ 1.

Every well-ordered provincial trade school shall have two classes—a lower and an upper one.

The lower class principally for theoretical instruction and practice in drawing, the upper for the application of this instruction to trades.

The course of each class will last a year.

§ 2.

The following conditions must be complied with before a pupil can be admitted into the lower class:—

1. The pupil must be at least fourteen years old.

2. He must not only be able to read fluently, but must be able to derive information from any book, the subject of which ought to be within his power of comprehension.

3. He must be able to write German without any gross orthographical mistakes, and in a legible hand.

4. He must be well acquainted with calculation in whole numbers and vulgar fractions, and be able to apply them in ordinary problems.

He must also know how to measure plain rectilineal figures and prismatic bodies.

5. He must possess some practice in drawing.

§ 3.

The admission to the upper from the lower class of the provincial trade school must be preceded by a careful examination extending over the whole course of instruction given in the lower school. Pupils who have not been able to pass are allowed to have one more trial after another course in the lower class.

Pupils from other schools who have been tested by this examination, may enter the upper class at once.

§ 4.

The subjects taught are: pure mathematics, physics, chemistry, chemical technology, mineralogy, mechanics, and a knowledge of machinery, architecture, drawing, and modelling.

The instruction must in no class exceed twenty-six hours weekly.

§ 5.

Every well regulated provincial trade school will have final examinations, made according to published regulations.

The right to omit these final examinations and the granting of certificates of proficiency, can only be given by express permission of the Minister of Commerce, &c.

Rules for the Final Examinations in the Provincial Trade Schools.

§ 1.

The object of these examinations is :—

1. To ascertain if the pupil leaving has obtained a sufficient amount of knowledge to enable him to enter upon an industrial career with a chance of success.

2. To furnish the schools and their scholars with a worthy object for their combined efforts.

3. To assure to the pupils who have obtained the certificate of proficiency the privilege of admission to the Royal Trade Institution of Berlin.

§ 3.

The right to enter for these final examinations is given—

(a.) To those scholars who have attended the first classes for at least a year.

(b.) To pupils from gymnasiums, and to scholars who have passed the final examinations at authorised "real" schools, and who have been in the first class of such an institution for at least one year.

(c.) Also other youths who are supposed to have acquired the needful proficiency elsewhere than in the above-mentioned schools.

Each candidate for examination must send in to the director of the Provincial Trade School before the middle of June in each year, a short-written account of himself, and strangers will have to produce, in addition to this, a school certificate and a specimen of drawing.

§ 6.

The examination will be both written and by word of mouth

§ 7.

After these examinations certificates will be granted to the candidates bearing the signatures of all the members of the commission. The certificate will either show the proficiency of the candidate to be great or moderate, or will declare his incapacity. A declaration of incapacity withholds every privilege which can be obtained by a certificate of proficiency.

§ 9.

The demands made are as follows :—

(a.) In German, the candidate must possess some skill in free verbal delivery, and in the composition of easy themes on some given subject.

(b.) In common and commercial arithmetic he must not only be thoroughly acquainted with the rules and their principles, but must be able to apply them with facility.

(c.) In *bookkeeping and algebra* he must be well grounded in the four rules, of arithmetic, common measure, powers, and roots, arithmetical and geometrical progression, logarithms, equations of the first and second degree, and must have acquired practical facility and correctness in algebraical calculations.

(d.) In geometry he must have a tolerable acquaintance with the theorems of plain geometry, stereometry, and plain trigonometry, and of the solution of geometrical problems by construction; he must also have a facility in applying algebra and trigonometry to geometry, as well as in trigonometrical calculations.

(e.) In physics he must have an elementary but correct knowledge of the whole range of this science, when possible, made plain by demonstration.

(f.) His chemical knowledge must also, as much as possible, be supported by experiments and demonstrations, and he must give a sketch of the domain of inorganic chemistry; he must show some acquaintance with special chemical-technical processes, although he will not be expected to know them thoroughly or in detail.

(g.) His knowledge of natural history must extend to those minerals which may be applied to trades.

(h.) He must be well acquainted with the groundwork of mechanics and the knowledge of machinery.

(i.) He must know the elements of architecture.

(k.) In linear drawing he must be able to make a correct and clear drawing; to apply the principles of the theory of projections and of the construction of shadows to the drawing of simple machinery and buildings, and to represent them in ground plan, elevations, and sections. He must be practised in free-hand drawing and modelling, and have acquired accuracy of eye.

§ 16.

During the examination itself, as well as when judgment is pronounced, the depth and solidity of the acquirements attained ought to be held specially in view. The candidate who has passed well in all subjects, and extremely well in at least two, has a right to a certificate with the predicate "passed with distinction;" he who has passed well in mathematics as well as chemistry and physics, and tolerably well in the other obligatory subjects of examination, will receive a certificate with the predicate "good;" he who has passed well in mathematics. and tolerably well in other subjects, receives a certificate with the predicate "sufficiently well."

Those of the candidates who have gone through the examination with still less success will be refused any certificate of maturity.

Extraordinary proficiency in one subject of examination cannot make up for deficiency in another subject.

§ 19.

Such candidates as have shown themselves in one or other departments of the examination possessed of extraordinary knowledge or readiness, will be allowed in the *viva voce* examination to give special proof of their proficiency, and particular mention will be made in the testimonials of the degree of knowledge and skill they have attained in those special branches.

Every candidate not belonging to the school must pay five thalers for examination, which sum will be divided equally among the professors of the examination commission.

An examination must be held every year, even when the only candidates presenting themselves for examination to the directors of the Provincial Trade School are persons not belonging to the school.

Extracts from the Regulations for the Organization of the Royal Trade Institution in Berlin.

§ 2.

The conditions of admission are:—

(*a.*) That the candidate must be at least 17 years, and at most 27 years old, which must be proved by the certificate of his birth.

Only extraordinary circumstances with a relaxation of this rule.

(*b.*) He must also give proof that during at least one year he has been employed in practical work at his regular vocation, unless he intend to be a chemist.

(*c.*) He must also show that he has passed his examination at a provincial trade school, entitled to hold such examinations, or at a *real* school, or at a gymnasium, and has received a qualifying certificate.

§ 3.

The pupils of the Royal Trade Institution of Berlin are divided into mechanicians, chemists, and builders.

§ 4.

The theoretical course of instruction extends for all the pupils over three years, and is divided into three courses.

Opportunity for practical work will be given to mechanicians and chemists in the workshops and laboratories of the Trade Institution, this will begin even before the close of the theoretical instruction.

Mechanicians are allowed to continue in the workshop for one year after they have completed their theoretical instruction.

§ 10.

The mechanical workshops of the institution are intended not only to instruct the pupils, but to give an opportunity for experiments, and to make new machines and models of various kinds for the Royal Trade Institution and the provincial trade schools.

Information concerning the Provincial Trade School in Dantzig.

1. Plan of Instruction.

Second Class.

1. *Arithmetic*, 4 hours. Arithmetic and algebra, the use of simple and compound quantities; use of brackets, equations of the first degree, with one or more unknown quantities; general proportion; powers and roots; the reduction of powers, and the extraction of roots; mixed examples and problems in general arithmetic and algebra will be given from Edward Heis' book.

2. *Practical arithmetic*, 4 hours. The use of decimals, simple, and double rule of three, rule of society, rule of three inverse with many examples out of interest, instalment, profit and loss, alligation and exchange rules, as well as in drawback, discount, commission, costs, tare, and valuations of different kinds.

3. *Geometry*, 4 hours. Angles, parallel lines; similar triangles; the similarity, proportionality, and equality of figures; the solution of numerous geometrical problems; explanation of field-measuring and levelling.

4. *Physics*, 4 hours. *Introduction.* Measure weight; density; states of aggregation; solidity; fluids; fundamental principles of hydrostatics;

determination of specific gravity, volumeter, areometer, capillary attraction, diffusion.

Of Gases. Mariotte's law; the barometer, the aneroid manometer.

Of Heat. Expansion, the thermometer, the pyrometer; specific heat, Wilke's law, changes of aggregate condition, latent heat, elasticity of steam; Gay Lussac's law; Dalton's law; hygrometer; psychrometer, the conduction of heat, the radiation of heat.

Of Sound. Origin and propagation of waves of sound; measuring of sounds, of musical instruments, tone figures.

Of Light. Photometer, rapidity of light, reflection, refraction, theory of colour; the eye and optical instruments; chemical operation of light. (Interference and polarisation were omitted for want of the requisite apparatus.)

Magnetism. Distribution; intensity; the earth as a magnet; graphical representation of the magnetism of the earth; disturbing causes; galvanism; Volta's pile; excitation of heat and chemical decomposition; polarisation; resisting and electromotive power; Ohm's law; Ampere's law; electro-magnetism; Motor's telegraphs; induction; magnetism produced by rotatory motion (*Rotations Magnetismus*); electricity produced by friction (*Reibungs electricital.*)

5. *Chemistry*, 4 hours. The most important elementary substances, and their mutual combinations; frequent stachiometric exercises; numerous experiments.

First Class.

1. Mathematics, 8 hours. Equations of the first and second degree, with one or more unknown quantities; logarithms; arithmetical and geometrical progression; summation of squares and cubes; Simpson's rules; plane trigonometry and the application of algebra and trigonometry to the solution of plane and stereometrical problems.

Introduction to Stereometry. The calculation of the most important solid figures according to different methods (Prionza pyramids, cylinders, cones, spheres, zones, solid zones, segments, and sections of spheres, oblique sections of prisms, pontoons, &c.), regular solid figures, practical calculations.

The principles of descriptive geometry, analytical and synthetical definition of the principal properties of conic sections.

2. *Mechanics*, 3 hours. Combination, division, and equilibrium of powers working from one point in a plane in different directions and in space; point of inertia (*Statisches Moment*), principle of virtual rapidity, powers which form a system of points in a plane work in a given direction; parallel powers; duplicate powers; powers in space in general.

Centre of gravity of lines of planes, of curved planes of solids; Guldin's rules; stability of solid bodies, more particularly of walls with different cross sections; sliding and rolling friction of horizontal and upright pivots; resistance against flexion by pulleys and chains.

Conditions of the balance of power in simple machines, taking into account resistances, flexion, sliding friction, and pivot friction, the lever and its various applications. Inclined planes, wedge, screws with flat and sharp spirals.

On Wheelworks. Determination of the friction of the teeth; determination of the proportion between strength and durability in some complex machines, endless screws, simple and complex screw-jacks, English windlasses, and cranes, taking into consideration all resistances.

Strength of Materials. Absolute and reactionary strength; strength of the different cross-cuts of wheels; forms of stave-formed bodies, in

which all the cross-cuts come equably into play; strength of torsion. Motion uniform, uniformly varying or irregular; combination of uniform and varying movements, simple fall, and projectile motion.

On motive powers, and their measure; momentary and constant force; motion of the bulk of a body; mechanical work of a power; active power; idea of the point of inertia; centrifugal force; movement of a body on an inclined plane; the pendulum; force of blow given by unelastic and elastic bodies.

3. *Physics*, 2 hours. A repetition of several of the lessons on magnetism, galvanism, and heat. Continuity of force; equivalent working power of physical and chemical forces; theory of the steam-engine.

4. *Chemical Technology*, 4 hours. Common salt, sulphuric acid, muriatic acid; soda and chloride of lime; nitric acid, potash, saltpetre, gunpowder, glass and earthenware, mortar. Description of the principal metals from their ores. Opaque colours (*Deck-Farben*). Introduction to organic chemistry, carbonisation, heating, lighting, lamps, candles, gas, soap-boiling, starch, sugar, fermentation, beer, brandy, vinegar. The most important parts of mineralogy were treated of in connection with the metals.

5. *Building*, 3 hours. Wood joining, construction of walls, fixing beams, floors, roofing, suspension and lattice work; construction of roofs with wood and iron; staircases.

Stone work. Construction of stone roofing. Development of the several kinds of vaults from the tunnel vault. Drawing of different arched lines. Construction of scaffolding. Execution of bows and vaults.

6. *Drawing and Modelling*, 16 hours. The two classes are combined into one for drawing. The scholars were, without regard to the class to which they belonged, employed each according to his skill and capacity, in the following exercises:—

(A.) *Linear Drawing*, 9 hours. Projection of straight and curved lines, and surfaces of various bodies (cubes, prisms, pyramids, cylinders, cones, spheres, screws, &c.). Intersection of bodies; construction of shadows; perspective drawing; construction of conic sections, cycloids; evolvent application of these curves in cog-wheels; construction of cylindric and conic tires from sketches and given logarithms. Drawings of separate parts of machines from sketches and models. Survey of parts of machines, and of complete machines.

Construction of stone work. The bow, the vault, fire places and flues, steps, roofing, &c. Survey and drawing of completed buildings.

(B.) Free hand-drawing, 7 hours. Drawing of ornaments from copies and models in outlines, with pencil and pen, as well as according to different methods of shading with chalk, with or without a stump, with sepia and Indian ink.

Modelling in clay, from models in gypsum.

The number of pupils attending this school during the years from 1855 to 1859, was 76. Of these, 32 had for some years previously been employed in practical work; 42 were mechanicians by trade; 6 millwrights, 14 carpenters, masons and builders, 4 merchants, 3 agriculturists, 1 shipbuilder, 1 copper-smith, 1 dyer, 1 chemist, 1 soldier, 1 teacher, and 1 clerk.

The attendance at the school, which to many will have appeared small, may yet be called satisfactory in comparison with that at other institutions of a similar kind. As in a locality in which the efforts and improvements of industry are but insignificant, we should not be justi-

fied in fixing a scale which would be adapted to a manufacturing district. We expect with confidence that it will be better supported when the industrial class better understand what will be to its advantage.

What are the best means of imparting Technical Knowledge, according to the requirements of their different stations, to persons who are working in and for the various branches of Technical Industry?

By Dr. H. Grothe, Professor of Chemistry, Physics, and Technology, and Master Manufacturer in Berlin.

It is not only the preliminary culture which is required for the higher technological studies, and the best means of imparting this, which ought to occupy us, for we have to answer the larger question, as to what education should be given to persons in general who are engaged, or who intend to engage in technical pursuits—who are the persons to be classed in this category, and what ought to be the aim of the enlargement of their knowledge?

Let us consider who are the persons we mean. In the first place there are the real workers, who execute for wages prescribed, and clearly defined tasks, or who, as more independent handicraftsmen, carry on with their own means a small trade, for which a limited amount of skill in a certain direction suffices.

Secondly, there is the class of working proprietors of manufactories, in which either raw materials are worked up into manufactured articles, or half finished materials are more fully elaborated.

Thirdly, there is the class of persons devoted especially to technics, who have to elaborate and organize according to rule those more difficult works in connection with technics which demand high scientific culture. This class requires not only comprehensive, but also deep and minute knowledge. It consists of men who have to carry out the most difficult operations, and to solve the most intricate problems of technics, and to indicate the mode of solution, as also to lead, as teachers, younger men up to the same heights as they themselves occupy—men who must have completely mastered entire spheres of higher knowledge, so as to be able, whether under favourable or under unfavourable circumstances, not only to understand the connection between the various branches of the undertaking they have to deal with, but also how to avail themselves to the full of the favourable circumstances, and how to paralyse, or to render innoxious, the unfavourable conjunctures.

For these three great classes the rapid progress of the present day renders an increase of knowledge necessary, but, as is self-evident, the increase must be according to their different degrees, and the State ought to afford the means for this. Let us now consider in how far it ought to be done for each class in particular.

There is in the present day a very strong tendency to cultivate in the more general sense of the word the artisan, that is to say the lowest class of technical workers. Is the word in this case properly applied, and would the artisan be benefited by the culture implied? Generally the question may be answered both in the affirmative and in the negative. The word culture has unfortunately in the most cases been understood in the sense in which it is applied to the really cultivated classes. But such cultivation is not suitable for the artisan class.

To the artisan the most of that which we have acquired and assimilated during a course of moral and mental education, begun early and carried on in various directions, and which we comprise in the word culture, is simply incomprehensible, because this education entirely fails him. Then suddenly you begin to speak to those people of all kinds of political relations, of chemistry, physics, medicine, history, the science of jurisprudence, &c. At first they listen with astonishment. Some of the auditors go further; what is said is new to them, they begin vaguely to apprehend that there are spheres of knowledge which have hitherto never appeared above their horizon; they begin to cogitate upon some point or other which their minds have seized upon—whether correctly or not, they do not know—to nourish thoughts which very rarely lead to any result, except, perhaps, to make the men feel uneasy and unhappy, as if treated unfairly by nature. A fruitless longing weighs upon their hearts and minds, lames their activity and their working power—a longing which, because it is based on that which they do not understand, and cannot comprehend, makes that which they desire seem far more beautiful and far more advantageous than it is likely to be in reality. A state of uncertainty and dissatisfaction ensues, which acts destructively as to their regular duties, and throws a gloom over their lives. Such is the effect on some.

Others listen; but as they fail to understand the greater part of what is said, their interest soon flags, and they await with passive indifference, the conclusion of the lecture.

In fact, those who belong to this portion of the auditors are by far the most fortunate. They at least do not endanger their means of subsistence by false conclusions drawn from matters which they do not understand, and to which they attribute consequences as to their means of gaining a livelihood, which destroy the steadiness of their working power, and lead from one disappointment to another. Few, very few, working men are benefited by such lectures.

Hitherto it has been the Working Men's Association or Clubs (*Handwerker Vereine*), which have more especially aimed at cultivating the artisan. In the first rank of these institutions in Germany, is the Working Men's Union in Berlin. In as far as these associations endeavour to improve the education of the artisan in elementary knowledge and skill, their activity is praiseworthy. The higher lectures which treat in a popular manner of history, literature, technics, industry and trades, geography and travels, are also of great use. But if subjects such as political science, physiology, and medicine, the science of jurisprudence, &c., which to be understood, necessarily require previous culture, are lectured upon to an audience of working men, then it is useless to conceal that more evil than good is done, or, at least, that no really useful object is attained, and that the auditors only lose their time. Either the working man should hear nothing of these matters, or else he should be prepared to understand them; but thus to prepare him would perhaps be impossible without making too great claims on his time and his strength. Yet it is strange what a desire there is among lecturers to dish up before him such irrelevant matters. Why are not subjects chosen which lie within his sphere?

Let them open up to the artisan sources whence he may derive benefit for his trade. Let them tell him of the auxiliary means of which great industrial undertakings avail themselves. Let them furnish him with guidance and exemplars to develop his taste, and with this to improve his skill and his power of production. Let them point out to him ways and means to shorten and simplify the processes for

carrying out his work, and teach him to increase his elementary knowledge, to understand the matters connected with his daily needs. Even when this has been done it will hardly be advisable to go further, and to introduce him to the higher sciences. How different is the course pursued may be seen for instance by the programme of lectures delivered in the Workmen's Union in Berlin, in the years 1861—63. They were:—

24 Lectures on pedagogic science!
23 „ political economy.
87 „ medical and natural sciences.
21 „ the science of jurisprudence!
53 „ art and literature.

In all 208 lectures on matters which to the artisan, with his small amount of previous culture, must be more or less incomprehensible! On the other hand there were:—

32 Lectures on technics, commerce, and industry.
31 „ geography and travels.
34 „ history.
19 „ architecture and mathematics.

It is, 106 lectures on subjects really useful to the artisan; for travels he can follow in mind, technical subjects lie near to his own sphere, and historical accounts are always interesting to him. But 106 lectures suited to his state of culture opposed to 208 on subjects hardly comprehensible to him, give but too true a picture of the disproportion between the useful and the useless efforts made in his behalf.

We are of opinion that the principal defect in all national economical efforts arise out of the false estimate formed of the capacities of the working man. Were we to be called upon to solve the question: "what is the process of education which would be really useful to the working man?" we should deem it impossible to conceive and frame a single system which could act equally satisfactorily on the very heterogeneous elements which make up the mass of the working classes; we should on the contrary endeavour to divide this mass according to the distinctive qualities of its elements, and to determine according to these qualities, what would be required for the improvement of each. The fault of all builders of systems of political economy has, on the contrary, been, that they speak of the working classes as if they constituted a homogeneous mass, the individuals constituting which are all endowed with the same qualities and the same capacities. Even the otherwise so practical system of *Schulze Delisch* labours under this defect. For the foundation and support of loan societies (*Vorschuß kassen*) and co-operative stores (*Consumver-linen*) the working men may indeed be considered as a homogeneous mass, but not so for the foundation of productive associations (co-operative societies?). In such cases Schulze Delisch's system proves to be excellent for some trade or industrial undertaking, and quite inapplicable to others.

For such purposes it is absolutely necessary to divide the system of co-operative societies into as many small, particular systems as there are trades, or at least groups of almost similar trades. For instance, locksmiths and machine builders may form together a productive association, because there are fixed rules (*Gesetz mässigkeitz*) in these trades. On the other hand, as, alas! experience has shown, shawl weaving is not suited for such association. In this trade it is not skill in weaving, &c., that secures success, but taste, which is proportion-

ately but very little developed among working men, besides calculation, a knowledge of the demands of fashion, of the various materials used, &c.

We will now for the purpose of elucidating our problem, consider some few industrial trades individually, and ask ourselves what things would conduce to their improvement, what subjects would best contribute to the cultivation of these artisans, what, for instance, would be most useful.

1. To mechanical engineers? Drawing, and perhaps a few hints as to alloyage, and to the working of iron ore. Mathematics enough for the purposes of construction.

2. To the mason and carpenter? Drawing, perhaps also some knowledge of the materials used in building, and the modes of preparing them. The elements of geometry.

3. To the weaver? Drawing of patterns. Directions as to gluing the warp; perhaps also an account of the preparation of the raw material until fit for weaving, and of the qualities of yarns.

4. To the cabinet maker and turner? Drawing notices as to the producing of polish.

5. To the tanner? New methods of tanning.

6. To the potter? Drawing. Modelling notices of various kinds of glazing.

7. To the tailor?

8. To the shoemaker?

Perhaps to both a knowledge of the qualities of good materials? But experience teaches them that far more efficiently than it could be done by description or by rules.

9. To the comb-maker? Drawing.

10. To the miller? Drawing of the various details of the mill. Mathematics. Methods of grinding-mill arrangements.

11. To the fuller?

12. To the dyer? Notices of the character of the different dyestuffs, and their action on the different materials to be dyed.

13. To the basket-maker? Drawing.

14. To the glazier? Drawing. Modes of testing the qualities of glass.

15. To the stucco plasterer? Drawing, modelling.

16. To the house painter? Drawing, a knowledge of colours, and how to unite them.

17. To the gardener? Drawing.

18. To the cotton printer? Drawing, and some notions of chemistry.

19. To the ropemaker?

20. To the cooper?

21. To the brass founder? Drawing, modelling, alloyage.

22. To the tinman? Drawing.

23. To the pavior?

24. To the tile layer? Drawing, mathematics.

25. To the waggon builder? Drawing, mathematics.

26. To the saddler?

27. To the book-binder?

28. To the soap-boiler? A knowledge of fatty substances and of alkalis.

29. To the baker?

30. To the copper-smith? Drawing, modelling, mathematics, &c.

From this enumeration it already appears what are the real re-

quirements of artisans; and yet we have, in making it, chosen those trades in which they work more or less independently, because to the great mass of men working for wages even these requirements hardly seem necessary. We come, therefore, to the conclusion that skill in drawing principally should be encouraged and promoted, and that an elementary knowledge of mathematics and of technical chemistry may be considered useful auxiliaries; but the latter should, however, only be given in the special cases in which it is required, and then only within narrow limits.

For this *first* class of technical workers, therefore, schools are useful in which are taught principally *drawing*. In addition to this, a little mathematics, the German language, a little natural philosophy, and perhaps a knowledge of the materials used in the trade.

Such schools, organized in a manner that may be worthy of imitation, have been introduced in Hanover, Nürnberg, Hamburg, and other cities. On a level with these are the numerously established building schools.

Everything beyond this which is offered to the working classes surpasses the strict requirements and the proper objects of their education, and must be seriously weighed, and cautiously given, for the reasons mentioned above. The object of such further instruction should be to promote a certain amount of general cultivation, and for this purpose ought not to go beyond matters which are easily comprehended. The organization of schools of this kind should, as much as possible, be regulated according to local circumstances.

What has been said may possibly lead readers to the conclusion that the writer is hostile to the spread of education among the working classes. This is, however, by no means the case; but he has, during intimate intercourse of many years with the working classes, and as teacher in the Workmen's Union in Berlin, made experiences which have led him to the view of the subject which he has here set forth. The communications of friends who have likewise had opportunities of gaining experience as to this matter have confirmed him in his opinions. In these days of zealous philanthropy it is necessary that one should keep his mind sufficiently unbiassed and calm to be able to form a clear conception of what is right, and to judge between the numerous mistaken efforts that are made, and those that are really useful.

We now come to the *second* class of technical workers, which we have already characterized above. We mean consequently proprietors who carry on in their establishments the special manufacture of certain articles, and whose position is such as to enable them to employ competent persons to direct and supervise the separate branches of the business. In these manufactures raw materials, for instance, are used, which are either worked into materials for further manufacture (such as yarn, leather, &c.) or into furnished materials (such as textile fabrics, shoes, &c.), or they elaborate further materials produced by previous manufacture (as dressing, dyeing, &c., textile fabrics). Such elaborations do not require very complicated processes, calculations, &c., but may be executed with little trouble and with the aid of but few technical means. In these cases, therefore, the highest degree of scientific knowledge is not required, but merely a moderate acquaintance with technical matters and processes. In this class may be included the following industrial trades: soap-boilers and candle manufacturers, brewers, master masons and master carpenters, sugar manufacturers, mill proprietors, turners, dyers, weavers, spinners, tile burners, potters, china manufacturers, cotton printers, &c.

People of this class must know something of technical science in order that they may be able to superintend their own business, that they may not be dependent on their subordinates, but, on the contrary, be capable of controlling them, and in order to be able to follow intelligently the improvements in technics, and to apply them for the advantage of their business. Moreover, as the position of such men will place them in personal relations with the higher classes of society, it is but right and proper that they should put themselves in possession of general culture before they apply themselves to the special culture required for business. The sketch which we lately published of the preliminary education necessary for those who would devote themselves to technical studies describes the organization of an establishment containing three classes, which would afford all the instruction required. Such an establishment would constitute a high school for the persons included in the second class of industrials; but we would wish that in that case the condition of admission should be proof of having completed the course of the second class of a gymnasium, or the upper second (*Obersecunda*) of a "real" school.

Any deeper study of science than these schools afford we do not consider necessary, for such study (for instance, higher mathematics, higher chemical analysis) would only add an amount of knowledge which is unnecessary for the business of such manufactures, &c., as we have been considering.

If men of this class should desire to qualify themselves more thoroughly for their special business, the best thing they can do is to attend for some time an appropriately special school, such as a dyeing school, a weaving school, a chemical laboratory, &c., or to enter a well-organized factory of the same kind as they wish to establish, and by working there add to the general culture and the theoretical technical culture which they already possess of the practical knowledge which they require. Such a mode of proceeding would, we think, be attended with success, and, above all, it would obviate the risk of over-loading the mind with useless knowledge, and losing much precious time.

We now come to the *third* class in the technical world. Having already characterised the men who constitute it, we will now only mention the special establishments which they are called upon to direct and superintend, and for the proper conducting of which they have to acquire the necessary knowledge. These are great industrial undertakings, such as smelting works and iron works, with all their various sub-divisions, great chemical works, large glass and china manufactories, mill works, ship-building yards, telegraphic construction works, &c., &c. Among this third class of persons devoted to technics are further to be reckoned civil engineers and teachers of technical science. For these the highest technical culture is necessary, and in our day a high degree of general culture is also expected in them. Considering that such general culture, besides being a thing that can be justly demanded of them, facilitates immensely the acquisition of the higher technical science, we deem it essential that the condition of admission into higher polytechnic institutions should be—

1. The production of a certificate of having attended the highest classes of a gymnasium.

2. Or a certificate of having passed the final examination of a "real" school.

3. Or the same from a Provincial Industrial School, which strictly answers the demands we have made with regard to them.

The advantage of Condition 3 seems, however, very doubtful. At all

events the first-mentioned two are much to be preferred as attendance in an industrial school must necessarily shorten the time given to the acquisition of general knowledge; on the other hand the course of study in a higher polytechnic institution goes over a good deal of the ground already traversed in the industrial school. The two drawbacks are thus shortening the time required for the acquisition of general culture, and loss of time in repeating, even supposing such repetition be not attended by any detrimental effects.

As a fourth desirable requisite, if not absolute condition, may be named, a short practical acquaintance with the special branches of technics to which the student means ultimately to devote himself. As to this point we are aware that very conflicting opinions are entertained, but we are assured that in many cases this mode of proceeding would be useful, and in others it is almost necessary.

We have now only to give our reasons for the great demands we make upon those who desire to enter the highest polytechnical educational establishments.

When examining the individual branches of technical activity, we cannot fail to be struck by the disproportionate number of persons seeking employment in them. What is the cause of this? According to our view it is owing to the low, and not sufficiently well defined, conditions of admission into the higher polytechnic schools, and also to ignorance as to the real requirements of a technical education. We would seriously recommend young people to consider well before entering on their technical career, what places they wish to fill, what demands such places must make on them, and how many vacancies there are.

The existing places which young men of this class might hope to obtain, are, in the present day, when our manufacturing industry is but in its early youth, mostly filled, and will probably long remain so; and new establishments do not come into existence in such great numbers as to render it at all probable that they will offer places sufficient for the number of young men who yearly leave the polytechnic schools.

This disproportion is particularly striking in respect of chemistry, and we cannot honestly do otherwise than strongly recommend young men not to devote themselves to technics—chemical studies. Let them but enquire into the position of the chemical students who leave the Royal Industrial Academy in Berlin, and they cannot but feel their ardour depressed.

Every one thinks that attendance at one of the higher technical educational establishments gives him a claim upon the highest position in the sphere of technics, and the number of persons crowding in is great in proportion to the weakness of the defences which guard the entrance. The same phenomenon has been observed in almost every one of the higher branches of study, and has led to the adoption of more stringent conditions of admission. How much more necessary are not such in the sphere of technical education, where no final examination is required? Latterly indeed such conditions have been introduced into the building schools, and have produced a very salutary effect. Let, therefore, these matters be seriously and impartially weighed, so that measures may be taken in time to prevent the deplorable consequences which are otherwise sure to accrue.

Plan for the Organization, or Re-organization of Educational Establishments for Imparting the Preliminary Knowledge required for Admission into the Higher Polytechnic School, and for the Acquisition of the Knowledge Necessary in Industrial Life.

By Dr. HERMANN GROTHE, Lecturer on Chemistry, Physics, and Technology, and Proprietor of a Manufactory in Berlin.

(Extracted from the Journal of the Society of German Engineers, Vol. x.)

Object of the Schools in Question.

The aim and character of these schools should be calculated to impart a full and comprehensive knowledge of such matters as are required for conducting larger industrial establishments, and for entering with success into the further study of the sciences connected with engineering, &c. These establishments are, therefore, in the first place, to lay the foundations of scientific and mechanical knowledge and skill; and, secondly, to develope this knowledge and skill until they attain the degree required for the object held in view.

Hitherto not one of the numerous existing schools has effected this object. In the gymnasiums scarcely any of the branches are taught which are important in an industrial sense, and in the "real" schools, &c., very little more is done in this direction.* The provincial trade schools have hitherto approached nearest to the purpose held in view, but they again are deficient in the very necessary elements of general culture, to possess which is so essential in the present day.

B. *Conditions of Admission into the Schools in Question.*

As the schools are intended to give the special education required for the higher branches of industry, &c., and must therefore in so far be considered as schools of a higher degree, the special scientific instruction given, and which is to be imparted in as short a time as possible, ought, therefore, to be based upon a certain amount of preliminary general knowledge. For this reason the possession of such knowledge (specified in detail below) ought to be demanded of all those who would enter the schools.

1. Fluent and correct reading.
2. Writing a good hand and correct spelling.
3. A certain power of expression, and facility in verbal delivery.
4. The power of giving a verbal or written account of the contents of a poem, or fable, &c., just read.
5. A knowledge of the fundamental rules of arithmetic, and also of the more advanced rules, particularly of fractions and of the rule of three.
6. A knowledge of elementery mathematics: theorems of lines, angles, triangles, squares and circles.
7. Elementary knowledge of algebra: sums, differences, products, quotients, decimal fractions.
8. Elementary knowledge of geography and history.
9. Elementary knowledge of natural history, zoology, botany.

It should be laid down as *highly desirable* that scholars should be possessed of knowledge equivalent to that of the class upper tertia of a

* The original affords no indication as to the date at which this was written.

gymnasium, or secunda of a "Real" school, and, besides this, an acquaintance with foreign languages.

The age of 15 seems the most suitable to fix for admission. At an earlier age they could hardly have acquired the preliminary knowledge requisite, nor have attained the earnestness of character and power of independent thought which are desirable.

C. *Rules for ascertaining that the Candidates possess the stipulated amount of Knowledge.*

1. Immediate admission may be granted to those—

a. Who can produce a certificate of dimission from the upper tertia of a gymnasium.

b. Production of a certificate of a dimission from the secunda of a "Real" school.

2. All other candidates should be subjected to a preliminary examination, to be held in presence of all the teachers of the school, and to embrace all the branches of knowledge required.

In passing judgment the examiners should be very particular, and rather incline to severity than to undue clemency.

D. *Subjects of Instruction and their relative importance.*

The principal branches of instruction in the schools we are preposing, should be, mathematics, natural science, drawing, and the, German language. Mathematics must stand at the head, then follow arithmetic, mechanics, theory of machinery, theory of construction, botany, mineralogy, zoology, technology, and bookkeeping.

E. *Extent of the Studies in each Subject.*

a. The mathematical studies should embrace the whole sphere of elementary geometry and algebra, as far as spherical trigonometry; should include notice of progression, polynomials, and divisors, and should end with the differential and integral calculus.

b. The instruction in natural science should embrace physics, chemistry, botany, zoology, and mineralogy, and draw within its circle the technical branches of these sciences as independent subjects of instruction, so that this section of studies should be divided as follows:—

a. Physics, which, touching rather slightly on purely scientific considerations, should extend to the deduction of the fundamental notions of statics, dynamics, hydraulics, &c., of electricity, magnetism, sound, light, heat. It would be desirable that the chief laws regulating these physical phenomena, should be made very clear to the scholars, so that they may retain a well-defined knowledge of them, while less important matters, though touched upon, should not be counted among the things that should absolutely be known.

Through the knowledge of these laws the scholar obtains a clear notion of all physical phenomena and theories, and they may then subsequently increase their knowledge by further study, either in or out of school. Another reason for insisting much on this point is, that pupils who, after completing the school course, mean to enter a higher polytechnic school, will in this have numerous opportunities for the study of the special physical phenomena, while to those who do not

intend to prosecute further studies, a thoroughly well understood survey of the whole domain is far more useful than a knowledge of the details of certain parts of it.

β. Technical physics should, as much as possible, go hand in hand with the theoretical instruction in the science, and be adapted to it. With respect to technical physics also, the treatment should not be too abstract, but should always hold the practical application in view.

γ. In chemistry also, the fundamental principles should first be considered, and the inorganic division be treated of, without entering too much into detailed notice of the various chemical combinations. With regard to the instruction in organic chemistry, a careful sifting of the immensely wide subject should be effected, and only such points touched upon as have become of real importance in life and in industry.

Above all we would strongly deprecate any attempt to make the scholars acquainted with the various *theories* of organic or inorganic chemistry, as up to the present moment none of these theories quite satisfy the demands made upon them. With regard to chemistry, as with regard to physics, care should be taken not to overload the scholar's mind, and as much as possible to avoid entering upon subjects of abstract science.

δ. In technical chemistry the chief branches should be taught in as far as these have become essential in practice. But those branches which are only indirectly of importance to industry, should either be entirely avoided, or only slightly touched upon. For instance, the processes of metallurgy should be treated less comprehensively than matters relating to the manufacture of soda, &c.

ε. Mineralogy.—These lessons should dwell less upon systematic theories and crystallography in particular, and more upon the character of the various rocks, and of the minerals in general from the chemical point of view, with special reference to their usefulness for building purposes, for chemical works, &c.

η. Botany should be cultivated in the schools in question, only in so far as it relates to plants most important from the technical point of view, and the various systems should only be glanced at cursorily.

ζ. Zoology.—With regard to this science the same principle should be followed.

The subjects of instruction mentioned under *ε*, *η*, *ζ*, might also form a combined branch of instruction, considered as "the knowledge of materials," which must always be of importance in a technical education, and which would at the same time afford an opportunity for the combined repetition of the lessons in the several natural sciences.

c. Arithmetic must be extended to every kind of calculation which occurs in business.

d. The theory of building should be confined within narrow limits, as the knowledge is of little use in consequence of the existing laws on building, which leave everything to be laid down by the officials concerned. It will therefore be sufficient to give only a general conception and judgment of building matters which come within the sphere of industry.

There will be the less objection to this limitation of instruction in this branch, as schools of the kind we are contemplating would not be able to form pupils for the architectural high schools, and as such scholars who understand building—for instance, masons and carpenters —would already be in possession of the knowledge which according to the plan of studies could be taught in the school.

The writer has been led by experience to this conclusion, and considers it well founded and easily comprehensible.

e. The instruction in drawing ought to include the three principal branches—architectural drawing, free-hand drawing, and mechanical designing. The commencement ought to be made with free-hand drawing, in order to give correctness of eye and steadiness of hand. The mechanical designing ought for a long time to be limited to copying the details of machinery, in connection with which exercises it would be very desirable that the mutual relations of the various details of the machine and their object should be explained to the scholar, so as to form an important contribution to the lessons in the knowledge of machinery.

It would, further be very useful when pupils have attained a certain amount of skill in drawing, to inquire what special branch of industry they mean to devote themselves to, and to hold this in view in making a choice of models for them to copy. For instance, it would be good to give to those who mean to become spinners, machines to copy belonging to this branch of industry; to those who intend to be weavers, designs for textile fabrics, mechanical weaving apparatus, &c. But at the same time the pupils ought not to be occupied exclusively in this way.

f. The instruction in the German language ought to be given with much more care, and with stricter reference to the requirements of the scholars than has hitherto been the case in industrial schools.

Abstract grammatical instruction is perfectly useless, and to the pupils in schools of this kind, mostly quite incomprehensible, or at least very difficult of apprehension. Instead of this the subjoined method should be followed.

Parts of some suitable classical work should be read repeatedly aloud, and the scholars then made to narrate what they have heard in their own words, and as independently as possible, but observing the same order as that in which the author has expressed his thoughts. The extract read should then be written down by the pupils, and then again read aloud.

The advantages of this method are, that the pupil learns at one and the same time correct German expressions, the correct formation of sentences, and correct spelling; in addition to which he gains a knowledge of good literary works. Recitation would also not be out of place, and the writer has learnt from experience in the industrial school at Hamburg, with what happy results the exercises of this kind, which he introduced, were attended. The scholars generally chose subjects from the history of technics and industry, and thus diffused at the same time among their fellow-pupils a knowledge of matters interesting to them.

It would also be desirable to include in the course of instruction the elements of bookkeeping and some knowledge of the laws concerning bills of exchange.

g. The instruction in mechanics should be limited to a knowledge of the laws most important for practical purposes.

h. The theory of machinery should especially touch on all the details of machinery as to construction and combination, and explain in what cases the various parts are applied. At the same time a certain amount of knowledge ought to be imparted of working machines, implements, &c., and mechanical technology thus be taken into account.

F. *On the Form of Instruction.*

The instruction should, in the first place, be given through lectures delivered by the teacher, and elucidated by drawings and experiments. Next, the teacher must endeavour, through frequent repetitions and questionings, to ascertain how far the scholars have assimilated what he has taught. Finally, about every fortnight or three weeks, themes should be written on questions and problems proposed by the teacher, and each one should be carefully read and corrected by him. In all the branches which will admit of written exercises of this kind, the strict answering of problems proposed should alternate with subjects which admit of a freer development and expression of thought in the pupil.

Every four or five weeks the scholars should be made to write extemporarily on some given subject. Such written reproduction of the matters taught tend very much to fix in the memory the knowledge gained.

G. *Distribution of the Subjects of Instruction into Courses and Lessons.*

The subjects named above should be distributed over two courses as follows:—

1. Mathematics.
   - Course I (*a*). Fundamental notions. Line. Angle. Triangle. Circle. Proportion.
   - (*b*.) Powers. Difference. Product. Quotient. Proportions. Equations. Logarithms.
   - Course II (*a*). Trigonometry. Stereometry. Spherical trigonometry.
   - (*b*.) Equations of higher degrees. Progression. Polynomials, and divisors.
2. Physics.
   - Course I. Fundamental notions. Statics. Hydraulics. Electricity. Magnetism. Galvanism. Sound.
   - Course II. Light. Heat. Steam.
3. Physical technology.
   - Course I. Hydraulic press. Water power. Pumps. Electromotors. Galvanoplastism. Telegraphy.
   - Course II. Photography. Fuels. Steam power, and similar matters.
4. Chemistry.
   - Course I. Principles. Metallic bases. Metals (about the half).
   - Course II. The rest of the metals. Organic chemistry: Cyanogen (*Cyan*). Organic acids. Cellular tissue (*Cellulose*). Sugar. Alcohol. Dyestuffs, &c. Fatty substances.
5. Chemical technology.
   - Course I. Sulphuric acid. Soda. Chloride of lime. Potash. Salts of iron. Alum. Salts of copper. Tile burning. China. Bleaching processes.
   - Course II. Dyeing. Soap. Gas. The manufacture of sugar and starch. Tanning, &c.
6, 7, 8. Botany. Mineralogy. Zoology (knowledge of materials).
   - Course II (*a*). Alimentary plants and their value. Plants used for textile fabrics, for building purposes, for fuel, for for the production of gas, for chemical products.

(*b.*) Minerals used for building, for smelting, for the production of salt, as fuel for dyeing, for chemical products.

(*c.*) Animals used for power, for food, for dyeing, for dress.

3. Arithmetic.

Course I. Calculation with whole and fractional numbers. Decimal fractions. Rule of three. Reduction. Calculation of percentage. Rule of society and allegation. Calculation of exchanges, of State bonds and private shares, of goods.

10. Theory of building, road-making, &c.

Course II. Building materials. Mortar. Laying foundations. Walls. Planning of fireplaces and flues. Construction of roofs. Dwelling-houses. Cattle stalls. Factories. Ditching. Sluices. Roads.

11. Drawing. Modelling.

12. German.

13. Mechanics.

Course II. Solidity. Motion. Speed. Power. Friction. Resistance.

14. Theory of machinery.

Course II. Mechanical movement. Waves. Cogwheels. Wheel-tires. Axles. Position. Winches. Couplings. Screws. Supports. Hand tools. Machines for making tools. Connecting apparatus. Tubes. Working machines.

15. Exercises in chemical analyses.

H. *Organization of a Third Course.*

For scholars who do not mean to enter a superior school, but who desire, nevertheless, to continue their studies, particularly as regards the most important technical branches, it would be advisable to organize a third course, extending over one year. This course should embrace the following subjects:—

1. Chemical technology.
2. Chemical analysis.
3. Physics and physical technology.
4. The knowledge of machinery.
5. Theory of building, road constructions, &c.
6. Mechanics.
7. Mathematics (beginning of the integral and differential calculus. Repetitions).
8. Drawing.
9. Visits to different works.
10. German language.

In aid of the instruction given the schools should possess apparatus for experiments, models, and drawings. Various materials.

Examinations should take place at the conclusion of every course, to determine whether the pupils are in possession of the knowledge required to render removal into the second course advisable. These examinations should be verbal and in writing. These examinations should not, however, have an exclusively decisive character, for pupils of the class and age of which we are treating, are apt to be shy and timid, and, consequently, unable to produce their knowledge. Their competency should rather be judged from the reports of the masters as to the proficiency shown during the lessons of the course, and from documentary evidence of this.

At the end of the second course, the examination of dimission should take place, and, if passed satisfactorily, should entitle to admission into a superior polytechnic school, or into the third course.

The examination that entitles to admission to the high schools should be conducted according to the rules laid down for the existing provincial industrial schools in Prussia.

The examination for admission to the third course should be as much as possible facilitated, so as to secure many scholars for this class, which is intended more especially for practical teachers, a proceeding which will not be injurious, as the course is devoted to repetition and expansion of the same subject taught in the lower classes.

Besides these examinations, as to the result of which written certificates should be furnished, the scholars ought to receive every three months a certificate of proficiency, of conduct and of industry during the term, and every month a critical review of their progress settled in a conference of teachers, should be read out to them, so that they may be constantly kept acquainted with the opinion of the teachers as to their industry and proficiency, and thus be encouraged in endeavours to give satisfaction.

On leaving the third course the pupil should receive a certificate entitling to the privilege of one year's voluntary service only in the army.

The honorarium for the instruction should be determined in accordance with local circumstances.

P.S.—The above plan is adopted to the particular question involved. But if there be question of a general system of technical education for the different social spheres and degrees, this plan, with some modifications, would hold a middle position therein. In a second paper,* the writer will explain his views of such a general system.

Plan for the Organization of Polytechnic High Schools, drawn up by a Committee of the Association of German Engineers.

In consequence of a lecture delivered by Mr. F. Grashof, at the seventh general meeting of the association, at Heidelberg, in 1864, on the principles that ought to guide the organization of polytechnic schools; and of a discussion that ensued, it was resolved, that in consideration of the great importance of this question for the rational development of industry, a committee should be formed of members of the association, to give deliberate judgment on the subject.

This committee was composed of the following members:—

1. J. Pützer, Teacher in the Provincial Industrial School, in Aix la Chapelle.
2. R. R. Werner, Engineer and Professor in the Royal Industrial Institute, in Berlin.
3. C. Kayser, Civil Engineer of Breslau.
4. H. Stöss, Practical Chemist and Manufacturer, of Cologne.
5. C. Gaertner, Manufacturer, of Buckan, near Magdeburg.
6. Dr. Stanner, Teacher in the "Real" School, in Magdeburg.
7. H. Hammer, Master Machinist, of Eintrachthülte, Upper Silesia.
8. Dr. Bothe, Director of the Provincial Industrial School, in Saarlouis.

* Given below

9. L. Duske, Engineer in the Workshops of the Royal Industrial Institute in Berlin, and Director of the Royal Gauging Office.

10. F. Neumann, Civil Engineer in Hulbe, in Bochum.

11. C. Schnelle, Engineer and Teacher in the Provincial Industrial School in Bochum.

12. R. Peters, Director of the Smelting Works, in Witten.

13. Dr. F. Grashof, Professor in the Polytechnical School, in Carlsruhe.

14. W. Kankelwitz, Engineer and Professor in the Workmaster School, in Chemnitz.

15. Dr. Behme, Director of the Industrial School, in Barmen.

16. Dr. G. Zenner, Professor in Federal Polytechnic School, in Zürich.

After a very lively discussion, extending over 18 hours, and in which not only the individual convictions of the members were brought into play, but also written statements issuing from several special associations, the following principles were laid down for the organization of polytechnic schools:—

1. *Object and Character of Polytechnic Schools.*

In accordance with the national character of the Germans, education for the higher technical professions can most advantageously be imparted in polytechnic schools. These schools should be high schools, and should answer to the highest claims which are made upon those who are to be employed in the technical departments of the service of the State, or in private undertakings, for which a knowledge of mathematics, the natural sciences, and drawing, is necessary, and also to the requirements of the persons who quality themselves for the profession of teachers of the technical and auxiliary sciences represented in the school.

2. *Conditions of Admission.*

The polytechnic schools should only admit students of not less than 18 years of age, who can prove that they possess a preliminary knowledge of the following branches, which will at the same time afford a guarantee of the possession of general culture.

The obligatory preliminary knowledge should embrace: elementary mathematics, including plane trigonometry, the elements of analytical and descriptive geometry, the elements of physics and chemistry; also skill in free-hand and linear drawing, fluency of expression in German, and a certain amount of knowledge of history and geography. A knowledge of foreign languages is likewise desirable, but should not be made obligatory.

Preparatory to the practical branches of study, in the school of practical work for one year in some establishment is recommendable.

3. *Division of the School into Branches.*

In addition to a complete course of the polytechnical (*real*) sciences, taught so comprehensively as to satisfy the requirements even of those who desire to become teachers of these sciences, the polytechnic schools should afford thorough scientific instruction in architecture.

In engineering (construction roads, aqueducts, canals, railways, and geodesy).

In the construction of machines and mechanical technology.

In physical and chemical technology; and under certain circumstances.

In shipbuilding, mining, and metallurgy, more especially iron-smelting.

4. *Division of the Studies and Extent to which each Subject should be Taught.*

The knowledge imparted in each of the branches taught in the polytechnic schools should be in accordance with the demands made by the service of the state, and by technical industry, and should be regulated by the board of teachers and the directors. Each principal branch should be divided into an encyclopædical course, giving a survey of the whole subject, and into several separate courses, each, as a rule, extending over six months, which, with reference to each other, and to the other branches of study, should be so regulated, that the entire amount of knowledge to be imparted in each branch may be mastered by industrious scholars of moderate abilities within a normal period of study, without overstraining. The elementary knowledge, more particularly of mathematics, which is required as a condition of admission should not be gone over again in the school, but should merely be included in the plan of studies as belonging to the historical comparative survey of the science. Attendance at the lectures on the branches of knowledge coming under the designation of general culture (political economy, statistics, history of civilization, literature, survey of jurisprudence, commercial science, &c.) should be encouraged as much as possible.

The plan of studies in the different branches to be recommended to the students, should in preference include in the first semester the general sciences, and in the second semester the technical sciences, but the rule should not be too stringently carried out, as upon the whole a tendency to divide the polytechnic school into a number of separate faculties should be avoided. Where a mechanical-school workshop is organized, the object in doing so ought merely to be to provide the apparatus and models necessary for the introduction given in the school, and the carrying out of experiments required for the solution of technical scientific questions.

5. *Matters relating to the Students.*

The free regulation of the order in which the studies shall proceed, and of the time to be devoted to them should only be limited in as far as concerns the necessary succession of certain subjects, constant repetitions should take place under the guidance of the professors, and on the proficiency shown by the students during these, as well as during the practical exercises in the laboratory, and in the workshop the notes for the certificates should be based. Continued irregularity of attendance should be punished by expulsion. In some of the branches of instruction hospitants might be admitted.

In addition to the certificates alluded to above, diplomas of proficiency in any particular branch selected might be granted after rigorous examination, held before the student leaves the high school, recommending the holder as a person well qualified for his profession. Such examination (the form and extent of which should be prescribed), and diploma ought to secure the privilege of admission to the highest

offices in the service of the State for which technical knowledge is required.

The subjects of instruction in the industrial school are—

I. *In the Preliminary Course.*

Mathematics (algebra, as far as the equations, inclusive of geometry).
Geometrical drawing and theory of projection.
Natural sciences (physics, organic and inorganic chemistry), botany and zoology.
German language (grammar, literature, rhetoric, composition).
Logic.
French language (grammar).
Free-hand drawing.
Stenography.
Geography.
Music and gymnastics (in the leisure hours and for extra payment).

II. *In the Special Course.*

1st Class half-year:
Mathematics, stereometry, and the elements of trigonometry.
Mechanics.
Principles of mathematical geography and astronomy.
Technology.
Mineralogy (orytognosy, geology, and geognosy).
Theory of machinery (parts of machines).
Designing machinery.
Free-hand drawing.
German language (rhetoric, exercises in composition, and literary history).
Political economy.
French and English languages (grammar, correspondence, and conversation).
2nd Class, half-year:
Theory of machinery (turbines, water-wheels, steam-engines).
Designing of machinery.
Free-hand drawing.
Practical geometry (surveying in summer).
The science of building, and the laws concerning building.
Bookkeeping and correspondence.
Commercial arithmetic.
Management of an industrial undertaking.
German language (grammar, exercises in composition, literary history.
French and English languages (grammar, correspondence, and conversation).
Construction of machinery for special uses. (Flour mills and saw mills, oil, bark, cement, and gypsum mills, breweries, sugar manufactories, gas-works, spinning and weaving factories, paper mills, working implement and tools, tile making and agricultural machines, pumps and fire-engines, &c., &c.)

The school of mechanical engineering in its preliminary course embraces the same subjects as that of the industrial school.

The secondary practical course also embraces the same subjects as the second course of the industrial school, with the addition of practical

work in the workshops (as blacksmiths, locksmiths, carpenters, turners, ironfounders, brassfounders, &c.), and in the theoretical course, of analytical plane geometry, the theory of perspective, &c., shading, and modelling in clay and wax.

The third or theoretical practical course, embraces in addition, general outlines of engineering, and the planning, designing, and executing independently machines and manufacturing arrangements.

The workmaster school differs in the exclusion of some branches only, from the other two schools.

Each of the three courses of the engineering school extends over one year, and each of the two courses in the workmaster school over half a year.

The pupils of the technicum pay for board and lodging, washing, light, fuel and attendance, 120 thalers a year, and for instruction, 80 thalers (in all £30). Ordinary scholars pay the same sum for instruction; extraordinary pupils and scholars pay 10 thalers more. The number of pupils and scholars attending the technicum during the school year 1866-67 (the second year of its existence), amounted in all to 58, of which 16 were pupils. Of the 46 ordinary pupils and scholars, 33 intended to become mechanical engineers, 5 millers, 2 spinning manufacturers, 2 builders, 1 farmer, 1 merchant, and 2 were undecided.

The Education of Machinists and Manufacturers of every branch, according to the Principles established in the Technicum at Frankenberg, (formerly at Mittweida).

By WILHELM HEINRICH UHLAND, Engineer and Director of the Technicum.

Education in General.

Over-education and mis-directed education, are expressions which are often heard at the present day, when an opinion has to be given as to the condition of the education of the present generation. The latter designation is quite appropriate, while the former, resting upon a totally false conception, must be declared to possess no authority. No one can possibly be over-educated or too much educated, but may easily be mis-educated, that is, wrongly educated. This mis-education is found in all stations of society; more, however, among the middle and higher, than among the lower classes.

But what is mis-education? Before it will be possible to give an exact notion of it, it might be as well to define what is to be understood by education.

"Education is the result of the improving of all parts of the human individuality, by which, formed into an harmonious whole, it may attain to the greatest possible perfection."

When there is no improvement at all in the human mind, it remains uneducated, but where there is a defective improvement or a mis-directed, one-sided progress, mis-education is the result. Mis-education is the pervading vice of our time; to prevent it and make it impossible, is the task of all instructors and educators of the people.

As already follows from the definition of the term, the education of man must be normal, that is, a true harmony must be established between the capabilities and activity of the individual organism which comprehends man as a whole in his physical and psychical relations.

If this harmony is wanting, the education is wanting, the education is one-sided, and revenges itself sometimes in milder form, but often by disease of body or of mind.

Before a man can turn his attention to, or employ himself with, any profitable result on any matters beyond himself, he must first learn to know himself and the circumstances in which he is placed; if this self-knowledge does not exist, his activity is nothing more than a groping about, of which the good results are dependent upon a happy accident, but are certainly destitute of any tranquillizing security.

The ground work of the harmonious education of man rests on the accordance of his natural abilities, on the unison between his feeling, thinking, and will.

This Unison is Established by Instruction and Education.

Instruction is intended to give form and substance to the mind of man. Form, by making him acquainted with the laws of human understanding. Substance, by instructing him as to the nature and being of man, and thus it teaches him to know himself: as he is, as a natural and spiritual creature, and also in his outward relations to his fellow-men, that is to the family, to the community, to society, and to the state and world in general.

From this self-knowledge springs a noble self-consciousness, and also noble desires, because man does not know himself only in his nature and being, but also comprehends his place as a member of the entire human community, and makes their weal and prosperity the aim of his endeavours.

Education forms the means of assimilating instruction; it operates by habit, example, and discipline.

In what manner we can work by means of education from the earliest youth, the time when a man is as yet little led away by extreme influence, and is most tractable, Pestolozzi, Fröbet, and many others, have shown us, and their systems are not difficult to be carried out by intelligent and well-instructed parents.

If the educator were to have the charge of his pupils whilst still children, his task would he easily accomplished; but it is far more difficult when he has to educate men who have already attained a certain age, and a self-sufficiency is developed, which is founded, not on self-knowledge, but on an over-estimation of self, and is mostly only employed in the gratification of their passions.

It is this task which in the present day is most incumbent upon teachers, and for its fulfiment various means and ways have been either proposed, or have already been made use of.

The Education of Manufacturers.

Not unjustly is our century named "the age of machinery;" and this points out who it is that in these times plays the chief part. It is also unmistakable that, with Watts' invention of the steam-engine, a new era has begun in the life of the working community, and every year adds to its powerful influence. A new class of society, "the manufacturing class," has been formed, and steam, "the powerful son of two elements," harnessed to its triumphal car, has, in a short time, won the mastery in social life. What the counts and knights were in the middle ages, the manufacturers are at present; the machines are their vassals, the workmen their squires, and the influence of the

manufacturing interest is now as powerful as that of knighthood was formerly, on the weal or woe of the people.

Every manufacturer has a power in his hands, which well applied may make him a benefactor of mankind. Many, perhaps happily for those around them, are not conscious of this power; but to make them conscious of it, and at the same time to place them in a condition to employ their influence for the good of their fellow-men, and profitably for their own advantage, forms the chief task of those who are called upon to spread education and enlightenment.

What has been said in the preceding section as to education in general, is peculiarly applicable to the education of the manufacturing class. Let us remember that often the weal and woe of hundreds, nay, even of thousands of workpeople, are dependent on the will of the manufacturer, and we shall not beable to close our eyes to the fact that the education of the manufacturer should not only include the practical part of his calling, but should aim principally at forming a humane disposition of mind.

Our technical schools perform wonders in the branch of instruction, but they do not *educate;* they form good technical workers, practical manufacturers, but they are too one-sided; they are deficient in the humane discipline which serves in the education of men. This is a neglect of serial laws, which cannot long go on, and which revenges itself on the one-sided learner already in the results of his business. Such a man is lost to himself; he becomes a machine, which may, indeed, be very useful in its particular vocation, but nevertheless remains a mere machine.

Zitter says in his excellent work on instruction and education:*— "The intelligence and culture of mind which are acquired in schools, are peculiarly requisite to individuals for the intelligent and profitable carrying on of their callings in practical life, however various they may be. Therefore, in many places it is the custom that, for the practical learning of a profession, the time of instruction is shorter for those who already possess a complete general education than for those who are deficient in it, because the former understand more readily. Experience also shows that those who, being deficient in general education, go through a merely practical course of study, and after that enter immediately upon their profession, and who do not find in the circumstances of life itself such cultivating influences as can compensate for previous deficiency in general knowledge, always remain, even in their special departments, behind others who have received a more advanced and profound general education. By a theoretical special training, aided by proper practice (for practical skill cannot be learnt theoretically, but only by the experience of life and by diligent exercise) a man of ability may indeed, although deficient in general education, be insured capability and skill within narrow limits, within fixed forms, and on accustomed paths; and a skilled workman may be readily trained under the direction of others; but for the enlightened and intelligent superintendence of a great undertaking, to insure ability and mobility of mind under the new, enlarged, and complicated relations which arise around the changeable phases of business life, in consequence of the manifold complications of the various branches of trade to be able to satisfy the increased demands of life, and to develop the spirit of invention and the power of combination required for the

* "Groundwork of the Theory of Educational Instruction, considered in its scientific and practical reformatory relations." By Professor T. Zitter, Leipsic; published by Louis Pernitysch.

proper arrangement, disposal, and profitable employment of unforeseen occurrences from unexpected points of view, to introduce judicious modifications into general rules, so as to adapt them to local or temporary circumstances—for all these, a solid and comprehensive general education is necessarily required, but one which at the same time does not lose sight of the practical, but introduces it in proper time. Besides this, a thorough general education given to individuals does not only aid them to carry on their business with more insight and improved result, but the State also and the national wealth are gainers by it—if in nothing else, in the improved means of taxation. Indeed, without national education there can be no national wealth, and without both, no national strength and no political freedom!"

The Organization of the Technical School.

A private individual often reaches his aim easier and in a more simple manner than the State. Experience has taught us that improvements and reforms in the department of education and instruction have mostly been effected by private persons and private schools (witness Pestalozzi, Basedow, Fröbet, Labymann, and others).

This was the leading idea in the foundation of the Technical School. Although the original plan of organization did not place education so much in the foreground as it is at present, it was only contemplated by receiving the pupils as boarders, after the example of Holyminden, to raise the results of the instruction; but an essential novelty was introduced in technical instruction proper, viz., at the commencement of the course of lessons the union of theoretic study with the practical learning of the trades, and at the close the practical application of the knowledge acquired in the institution itself.

In the course of time, a necessity was felt for a change in the original organization of the technical school, experience having proved that it is better on the one hand to leave the elder pupils of the institution (whose education, in the strict sense of the word, it was useless to think of improving) to themselves after the lessons were over, and to keep only the younger ones, who were still absolutely in want of discipline and strict superintendence, as boarders, and to divide the students, therefore, into pupils and scholars; and, on the other hand, in order to elevate the intellectual and moral powers of the pupils, which are generally but poorly developed on their admittance, the necessity arose for the establishment to include a preparatory school for the humanities.

Lastly, owing to the increased attendance, it became necessary to draw more divided lines between the different branches of education undertaken by the institution, and to pay particular attention to the education of the industrial class.

From this arose the new organization with its special arrangements, for the better understanding of which we may be allowed to quote here literally the sections relating to them in the general prospectus.

The technical school has for aim:—

1. To train young persons by instruction in practical work in the workshops, in technical sciences and their allied branches, and in work in the office for construction, combined with suitable education, to become mechanicians or technical workers (constructors, directors, or manufacturers), as also to be able men.

2. To give machine-makers, fitters, overlookers, &c., who have only

worked practically, an introductory theoretical knowledge, in an abridged course of study (similar to the school for overlookers).

3. To make those intended for manufacturers, or other industrial pursuits, millers, farmers, &c., acquainted with technical sciences, and their practical application, as far as is necessary, for the profitable exercise of their callings.

4. To give to those engaged in trade, who either enter the school specially for the purpose, or have learnt in the commercial establishments of the town, instruction in commercial sciences combined with practical training; and

5. To execute plans, estimates, and valuations for the exertion of factories and single machines of every kind, to undertake the execution of technical plans, to make drawings for all trade purposes, and to give information on all subjects coming within the sphere of industry and technology.

For the attainment of this aim, the institution is divided into a school for the construction of machinery, an industrial school, and a commercial school, is in connection with workshops for machinery, in which the pupils learn manual labour, and has a technical office, where, as has been mentioned above, drawings are executed for manufacturers, and which specially undertakes the arrangement of complete factories.

Besides this, there is in the establishment itself a boarding-house for pupils, in which they receive lodging, and are completely cared for.

The technical school is distinguished in its present form by a quite new, and as yet peculiar organization, which has the following special qualifications:—

1. *The Combination of Instruction and Education.*—The pupils in the institution are not only instructed, but, in accordance with the principles of true morality, trained to be intellectual and rightly disposed men, morally and physically.

2. *The Combination of Theory and Practice.*—By the application and carrying out of the system, that theory and practice should go hand in hand, and an opportunity is offered to the pupils of gaining practical experience at the beginning of their studies, and of applying theory rightly to practice, and of gaining a self-dependence in their profession, which can only be acquired with difficulty and slowly by another method of education.

3. *The Special Education of the Industrial Class.*—Till now the manufacturer has been obliged, either to be educated for commercial pursuits, or to attend a complete course of technical education, which takes up a number of years, as a result of which some one thing was generally omitted to the detriment of his proficiency in business. By the introduction of an abridged course of instruction for special branches of manufacture, every future manufacturer is offered an opportunity in the technical school of making himself thoroughly acquainted with the technical part of his special branch in the short space of from six months to one year, and also of receiving instruction at the same time in commercial knowledge; whilst a complete education is obtained by passing through the whole course of study in the industrial school, not only in technical and mercantile branches, but also in the humanities.

The instruction in the technical school is not given solely by lectures, as is usual in large establishments, but it is addressed specially to each individual pupil, whilst every regard is paid to his abilities and his future destination.

At the first glance the sphere of operation which the technical

school proposes to itself, may appear too extensive. But whoever will make himself more closely acquainted with the plan of study, and the connection of the different departments into which the whole is divided, will find that the omission of any one of these departments would leave a gap in the whole system, which would render the attainment of the desired end very doubtful. The circumstances of the present day are such that the education of any one who wishes to take an independent position requires a certain many-sidedness.

Nevertheless there is in the institution a complete division in the instruction, as a separate master is appointed for each special branch of study, and the technical office is divided into sections, of which each is employed in the culture of some special and allied branches. By going through the different divisions, the pupils obtain an example of how in a business the parts necessary for its profitable management can be divided, without disturbing the harmony of the whole.

The regulations of the technical school will be better understood if we consider the institution separately, in its two chief aims.

The Technical School as a plan of Education.

Whoever agrees with the precept of the English (unfortunately too little regarded in Germany), that "the education of man begins nine months before his birth," might feel himself tempted to depreciate the capabilities of the technical school as a place of education, as the pupils received there must be at least 14 years of age. Nevertheless, the technical school does not hesitate to assert its claim as a place of education, as education up to the 14th year, if there are no unavoidable hindrances, certainly belongs to the family, but from the age of 14 to 20, when the authority of the family is no longer sufficient, a plan of education is all the more requisite, and will prove effective in proportion to the efficiency with which the family has performed its part of the work of education. Every one knows that the age named is almost without exception the most important for the whole future life of man.

At this age the human mind is still malleable, the understanding has not yet attained maturity, and even if the previous education has been defective, this is the time, and precisely the right time to lead a man into the path which he ought to pursue in his future life, if he would worthily fulfil the purpose of his existence.

The danger which threatens young men in the second decade of life from bad company, and evil example, and which has been considerably increased by our present social relations, compared with former years, fills many parents with justifiable anxiety, and was often the reason why they allowed their sons to embrace another calling instead of a technical one, because the practical study which was unavoidably requisite to prepare them for a technical career, generally necessitated the young men's leaving their homes, and brought them into contact with uneducated people to whose influence very often neither parental admonitions, nor the good will of the master could oppose a sufficient counterpoise.

The educational theory of the technical school rests upon the principles set forth in the beginning of this paper. Their aim is to train the understanding and the moral nature simultaneously and equally. Although the whole staff of instructors assists generally in the work of education, a separate master is appointed for the special superintendence and guidance of the pupils.

Without being hindered in the development of their intellectual individual characters, the pupils, by familiar social intercourse acquire the habit of toleration and good fellowship, and are trained by example and precept in habits of order, diligence, and obedience. The lessons for the pupils are so arranged as to aid in the educational training, and this is also effected in an elevating and animating way, by suitable amusements, social walks, and scientific expeditions.

The Technical School as a place of Instruction.

For those acquainted with the subject the foregoing quotation from the general prospectus will have sufficiently explained, what advantages the technical school offers as a place of technical instruction; but for those ignorant of the matter, it will be opportune to give a more comprehensive statement of the same.

Establishments for technical instruction have hitherto only occupied themselves with the theory of machinery, even if a small workshop were annexed to some few of them, it was at best only employed for making models, but could in no ways offer a substitute for real practise.

Besides it is scarcely possible that a Government Technical School could have workshops connected with it, which undertake commissions for the general public, and till now there have been no private establishments of the kind. Instruction in a workshop for machinery (which usually preceded theoretical instruction, because it was considered to form a desirable practical groundwork to it), besides the disadvantages which have already been mentioned in the course of this paper, also labours under the special defect that it occupies a considerable time (from 3 to 4 years), and estranges the pupil from scientific study, besides which the admittance into good workshops is costly.

Everybody is absolutely agreed upon the point that practical instruction should precede theoretical study. It is only necessary to determine of what kind this practical instruction should be in order to attain its end with the least possible expenditure of time and money. The future undertaker of technical works should learn how work is done. He should learn what manipulations or operations are necessary in order to give to woods or metals any required form; it is less needful for him to attain manual dexterity, as he is not to remain a workman. This can be best attained in a small workshop, where on the one hand the pupil can easily acquire a comprehensive view of the whole course of business, and on the other hand can be specially superintended and instructed. In a large factory the pupil is generally lost; he is dependent on the good will of the workmen whether they will instruct him in particular works (for which indeed they have generally no time, as they do their work together with others). And lastly, the system of the division of labour which is introduced in these factories scarcely allows the pupil to be occupied with all kinds of work; he will even in the best managed factory, derive but little instruction, as, owing to his want of knowledge it is not possible for him to procure an insight into the whole course of business of the establishment.

Starting from this point of view, the technical school has placed its pupils in small workshops, where special attention is paid to them, and they are trained on a particular plan. Experience has proved, that by this course of study a period of from one to one year and a half will suffice to gain adequate knowledge of particular branches of industry.

The time of work is for the pupils only from 8 o'clock in the morning, till 5 o'clock in the afternoon, and therefore there is still time to instruct them theoretically from two to three hours daily, by which a preparatory study for the ensuing course is rendered possible.

The technical school possesses a further and important advantage in its connection with a technical office. Those intended for technical pursuits are generally obliged, after leaving the school, to enter a factory for one or two years as unpaid assistants, in order to adopt their theoretical knowledge to practice, and to learn to apply it. But this necessary instruction is already secured to the pupils of the technical school, in the institution itself. As the technical office undertakes the execution of technical plans, and upon the whole of all the business of the civil engineer, the same kinds of technical work is done in the office, as in the workshops of a mechanical engineer, and thus after completing the whole course of study in the Technicum, the pupils and scholars can immediately undertake a good paying situation, which the institution will help them to obtain.

When all is taken into consideration which has been said about the organization of the Technicum as a place of instruction, the conclusion must be drawn: that this technical school unites theory and practice in the true sense of the word, and by means of this arrangement is peculiarly qualified to train its pupils and schools to become self-dependent, intelligent, and practical workers.

But in addition to this, the course of study in the Technicum is shorter than in other establishments. This result has been partly obtained by the introduction of a longer time for study (namely, from six o'clock in the morning till six o'clock in the evening, inclusive of the time spent in the workshops), partly by the particular plan of study adopted. As the Technical School is not intended to train professors or Government engineers, it need only take into consideration the wants of practical life; and is enabled in its lessons to pass over without detriment to intelligibility or profundity a number of theories which can rarely or never be applied to practice. In addition, the instruction is very much simplified, from the outlines of plans, as well as collections of formulas, tables, and drawings for special branches of industry being placed in a printed form in the hands of the scholars, and serve them at once as books of guidance and reference for the whole of their lives.

On the same principle as is applied to the training of constructors or mechanical engineers in general for the shorter course of study has been arranged for the instruction of workmasters. This lasts generally for a year, but by the omission of some less essential points of study, it can be accomplished profitably in six months by those who have not sufficient means to continue a longer course, and who will study diligently.

The prospectus explains satisfactorily the organization of the department for workmasters, so that it would be superfluous to say more about it here. On the other hand the industrial school merits special mention. Hitherto there has not existed any school which was specially intended for the practical education of those intending to engage in manufacturing pursuits of any kind. Till now the future manufacturer has been obliged, if he did not wish to spend nearly ten years of his life in his general education, to be trained either for commercial or technical pursuits, but without exception the deficiences of this one-sided education, made themselves very perceptible to the prejudice of the business carried on.

The industrial school of the Technicum is intended to supply this

deficiency. As may be seen in the prospectus, the whole course of study lasts two years, but it can be reduced to one year, as the first year's course serves as a general preparatory training, while it is possible for those whose time and means are limited to acquire the most necessary, technical, and commercial knowledge in six months.

The plan for this special branch of industry (under the designation in the general prospectus of "the construction of machinery for special branches") is new of its kind. By means of it, the pupil does not only acquire a knowledge of the construction and employment of any machines or apparatus brought into use in any particular department of industry, but also receives a fitting instruction in every branch of the business. As in the school for the construction of machinery he has placed in his hands the draughts of plans and special formulas, tables, and drawings useful in the construction of the building, machinery, apparatus, &c., which may be needed in any kind of factory. The pupils thus acquire such a thorough knowledge of the technical part of their several professions, as to be not only able to estimate with precision the working power of any machine employed in the business, but are in a position to make original designs and plans for the reconstruction, improvement or alteration of factories in their special branch, and to carry on the business upon rational principles.

How important instruction in general knowledge is for those employed in industrial pursuits, has been already said in the paragraph on the "Education of the manufacturing class;" therefore when time and money will allow of it, no father should omit to let a son, whom he may wish to be trained for such pursuits, go through the complete course in the industrial school. He will not fail to feel the beneficial influence of such a training in moral and material respects.

Synopsis of the Classification, Organization and Status of the Educational Establishments in Austria.*

The educational establishments of Austria are classified as follows:—

I. Popular schools (lower and higher elementary schools and burgher schools) to which belong also the infant schools, the institutions for the blind, the deaf and dumb, and orphans, convent schools, as also the training establishments for school teachers (preparatory courses, seminaries).

II. Middle schools for instruction in the humanities and in industrial matters, gymnasiums, and "Real" schools.

III. High schools, *i.e.*, universities and technical institutions; under the former range the theological educational establishments, the academies of jurisprudence, the chirurgical academies, and the schools of midwifery, as also certain special educational establishments.

IV. Special schools, such as:—

1. Military schools.
2. Naval schools.
3. Commercial and industrial schools, as also navigation schools.
4. Agricultural schools, and schools for all matters relating to the culture and management of forests, and
5. Schools of art. To this class belongs also the Oriental Academy.

Class I and II only are given here.

* Extracted from Baron J. A. von Helfert's Reports on the Exhibition of matters relating to the Schools, held in Vienna in 1862.

I. Popular Schools.

1. *Infant Schools.*

The object of these establishments is to take care of, bring up, and give the first instruction, by means of ocular demonstration, to children under five years of age. They are charitable institutions for the lower classes of the working population, and are partly supported by the communes, partly by private associations, and partly by the heads of manufactories and other industrial undertakings. They are placed under the supervision of the central school authorities, though the State does not contribute to their maintenance.

They exist in greater or smaller number in all the larger industrial towns in the empire.

II. *Popular Schools proper.*

The general object of these schools is to educate children from their sixth to their fifteenth year to be religious, moral, and useful beings, while the special object of the schools is to prepare the pupils for higher educational establishments.

There are public and private popular schools. The former are established under the influence of the state authorities, are recognized as public schools, and are authorized to give authoritative certificates. The private schools, on the contrary, are established by private individuals with the consent of the State authorities, and only enjoy the privilege of issuing certificates recognized by the State when they are organized entirely in accordance with the educational law, and distinguish themselves by the results they produce. The public character of the popular schools is the rule, and it is only in the larger towns that there are private schools of the kind, in addition to the public ones.

The popular schools are in accordance with the extent and object of the instruction imparted in them, divided into three classes: the lower elementary schools with three classes, the higher elementary schools with four classes, and the burgher schools with six and seven classes.

The lower elementary schools provide the minimum of instruction which the law requires that every child shall receive. The subjects taught are religion, the native language, writing, cyphering, singing, and needlework to the girls. Of natural history and geography the children are only taught the leading facts in connection with their reading lessons. In some of the schools instruction is besides given in some branch of rural economy, such as the cultivation of fruit trees, rearing of bees and silk worms, gardening, &c., according as local circumstances may determine. As regards this class of schools, attendance is compulsory, and public lower elementary schools must be established wherever they are required.

The higher elementary schools comprise the instruction given in the lower, and carry it further, and add to this a second language of the country (in some places even a third) and drawing. As a rule higher elementary schools are established in all towns with a population above 3,000, though the law of compulsory attendance does not extend to these schools.

The burgher schools give the instruction included in the higher elementary schools, and have besides two and often three classes for

such practical subjects (*Realgegenstände*) the knowledge of which is of importance in minor industrial and agricultural pursuits. These practical classes are arranged very much like the lower classes in the "Real" schools, and they, therefore, approach the sphere of the middle schools. They are, however, distinguished from the latter in as far as the special instruction is given in a less scientific manner, and more with a view to the practical wants of the scholars, as the greater number of these conclude their school education on leaving the burger school, and enter immediately into their various callings. For this reason the law allows the science, &c., practical classes (*Real Classen*) in burgher schools, to be adapted to the wants of the special branch of industry prevalent in the locality, and the course of instruction in a special direction to be extended over several additional years. Burgher schools are, as a rule, established in all industrial towns of 6,000 or 7,000, but their institution is not required by law.

Special Popular Schools.—These are the schools existing in connection with many large factories, the institutions and schools for deaf and dumb, and blind children, and the numerous female work schools.

The confessional character of the popular schools, which are more especially educational* establishments, is strongly guarded by the State. They are, therefore, *Catholic* popular schools, belonging to the Roman, the Greek, and the Armenian rites; popular schools of the *non-united Greek* and *Armenian* confessions; *Evangelical* popular schools, belonging to the Augsburg and Calvinistic confessions; and special schools for the children of *Unitarians* and of *Jews*. There are, however, also common schools for children belonging to the various rites of the same confession, and children of non-Christian religions are allowed to attend the Christian schools, and may, indeed, be admitted into these wherever circumstances preclude the establishment of special schools for them.

The popular schools are either boy schools, or girl schools, or common schools. In the southern parts of the empire the separation of the sexes is the rule in all the popular schools, and is indeed prescribed by law as regards the lower elementary schools in towns, and as regards the higher elementary schools in every case. The burgher schools are exclusively boy schools.

Week-day Schools and Perfecting Schools (*Fortbildung schulen*).—Every public popular school is at one and the same time a week-day school and a perfecting or Sunday and holiday school. The daily instruction in the week-day school extends over four to five hours; in the Sunday schools, over two to four hours. According to the law making education compulsory, all children who do not at home or in private schools, obtain the necessary instruction, are bound to attend the public popular schools, from their sixth to their twelfth year, and if they do not go immediately from the popular work-day school into a higher educational establishment, they must further attend the Sunday school, until their fifteenth year. The object of these schools is to perfect the children in the branches of education most important in practical life. These schools vary in their plans of instruction according to the requirements of the scholars attending them. The higher elementary schools and the burgher schools have also Sunday classes adapted to the amount of previous instruction possessed by the scholars. Instead of Sunday Schools, evening schools are often established.

The method of instruction followed in the popular schools, is in

* Education is here meant to distinguish the general bringing up of the child from its mere instruction.

every class adapted to the powers and faculties of the children. Teaching by ocular demonstration is the rule, and is facilitated by the apparatus for teaching, which all the schools possess. Within the limits prescribed by law, the teachers are free to follow their own judgment, and may adopt the methods they think most likely to succeed. The school books, and even the reading books, are, however, all selected by the State authorities, and about one-fourth of the number printed are annually distributed gratuitously among the poorer children of the schools.

Normal schools, for the education of teachers in the lower and higher elementary schools are established in all the provinces of the empire. The course of instruction extends over two years, and candidates must have filled their 16th year, and must have attended previously a burgher school, a lower "real" school, or a lower gymnasium; or, in case of girls, a higher elementary school, or a "*Töchterschule*" (school for daughters).

For the education of governesses for the upper classes there are separate, richly endowed, State institutions, into which a certain number of the daughters of military men and of State officials are admitted gratuitously. The education begins at the age of 8 or 10, and continues until the pupil has attained 18 or 20.

Teachers for the burgher schools are trained in separate establishments, the course of instruction in which also extends over two years, the candidate being required to have previously attended a higher "real" school.

As a means of continuous culture for the teachers of all classes, the State has by law established numerous teachers' libraries and school libraries, and annual school conferences, or meetings of schoolmasters, under direction of the district inspector of schools.

Position of the Teachers.—In the country the service in the schools is generally connected with some subordinate service in the church. The teachers in the lower elementary schools enjoy, in addition to free house and other subsidiary advantages, annual salaries, varying in amount according to local circumstances, but averaging about 250 florins. In the higher elementary schools and the burgher schools, the annual salaries amount to from 300 to 800 florins, in addition to other emoluments which many of these teachers enjoy. Besides this, a great number of the schoolmasters are allowed to give extra lessons, for payment, out of school time, and thus, in the large towns, more especially, add considerably to their incomes.

Besides the real teachers, there are second masters, or adjuncts, receiving lower salaries.

The entire body of popular schoolmasters are appointed directly or indirectly by the State authorities, and are under their supervision. Even when schoolmasters are not attached to a State school, and when, therefore, they are not real State officials, they enjoy the privileges of such, and they also enjoy in the commune a position commensurate with their important calling. They cannot be dismissed without the consent of the Government.

Provision is made by law for the families of deceased schoolmasters, and there are besides special institutions, by becoming members of which they may themselves secure pensions.

Maintenance of the Popular Schools.—The burden of maintaining the popular schools rests partly on the State, partly on the communes. The State provides, by special school funds and stipends, for the normal and training schools; it supports besides a number of higher elementary

schools, and burgher schools, and all the institutions for the education of blind, and deaf-and-dumb children. With these exceptions the State limits itself to affording assistance towards the establishment of popular schools, where they are wanted, and the local means are insufficient. The lower elementary schools are, according to the law, making attendance at school compulsory, obligatory schools, and, as such, belong each to its separate commune. Many of the communes, however, enjoy the aid of a school patron (generally one of the large landed proprietors in the neighbourhood), who exercises his right of patronage, either in accordance with certain covenants and foundations, or in accordance with legal regulations. The maintenance of the school is also in a measure provided for by the school fees paid by the scholars whose parents are not in indigent circumstances, and which amount to from 1 to 4 florins annually, according to the different class of the school. Poor children are admitted to the schools entirely free of expense, and no special poor schools exist in the State.

Connection between the Schools.—The scholars of the lower elementary schools, after they have attained their twelfth year, generally either become apprenticed to some trade or enter into some other practical employment, in which cases they must continue to attend the Sunday school until they have filled their fifteenth year. In other instances the scholars, having satisfactorily completed their studies in the lower school, even before their twelfth year, go over into the fourth class of a higher elementary school. From this the pupils either go at once into practical life, and must attend the Sunday school until they have reached the age of fifteen, or they are removed into the lower "real" class of a burgher school, or of a "real" school proper, or of a gymnasium, a military, or any other professional school, &c.

Superintendence and Direction of the Popular Schools.—The immediate superintendence of the lower elementary schools falls upon the clergyman of the parish, and an assistant chosen from among the members of the commune. The higher elementary schools and the burgher schools have each a director, who belongs to the staff of teachers. For purposes of higher supervision, the schools are divided into districts, and in each of these the superintendence as to instruction is exercised by an ecclesiastical dean, and all matters regarding the outward organization and economical needs of the schools, are watched over by the Governmental district authorities.

II. Middle Schools.

1. *Gymnasiums.*

The object of the gymnasiums is to impart higher culture, specially through means of the classic languages, and as a preparation for the universities.

A complete gymnasium consists of an upper and a lower gymnasium, each having four classes. The lower gymnasium prepares the scholars for the upper gymnasium, as also for the upper real schools, but at the same time gives a complete course of general instruction. The upper gymnasium continues this instruction in a more strictly scientific manner, and is specially the preparatory school for the university.

The gymnasiums are either public or private schools. The former only are entitled to give certificates having the character of a State document.

The complete gymnasium has 12 masters, the lower gymnasium 6, one of whom acts as director.

The subjects of instruction are religion, Latin, German, a second language current in the empire, history, and geography, through eight classes, Greek from the third to the eighth class, natural history in the first, second, fifth, and sixth, physics in the third, fourth, seventh, and eighth, philosophical propædentics in the seventh and eighth class. In modern languages, caligraphy, drawing, singing, and gymnastics; the lessons are optional.

The annual school fee in the gymnasiums, which are supported or subsidized by the State, varies from 8·4 florins to 12·6 florins, and is paid into the Treasury of the special gymnasium concerned. Proved indigence, blameless conduct, and steady progress, entitle the scholar to exemption from the school fee. In addition to the annual fee, there is an entrance fee of 2·1 florins, which is applied to the purchase of school apparatus, and to remunerating the examining masters. The school fees for all the gymnasiums in Austria amounted, in 1859, to 274,372 florins. In connection with the gymnasiums there are numerous scholarships founded by the State, by corporations, and by individuals.

The average cost of a complete gymnasium is 12,000 florins annually; the salaries of the masters vary from 1,155 to 1,365 florins, besides which every director and master receives at the end of every ten years an addition to his salary of 150 florins, and after thirty years' service, has, if he be unfit for public duty, the right to retire with his full salary as a pension.

2. "*Real*" *Schools.*

According to a decree of 1851 the "real" schools were established as independent institutions under separate direction, and are divided into lower real schools, with courses extending over three years, and upper real schools, with courses extending over six years.

The object of these schools is to give, in addition to a general education without the aid of the classical languages, a medium amount of such instruction as is required in industrial life, and for admission into the technical institutions.

The lower "real" schools, and the first three yearly courses of the upper schools give the complete education deemed necessary for the lower trades, and further prepare the pupils for the higher classes.

The obligatory subjects of instruction are: religion, the German language, history and geography, arithmetic, natural history, physics, chemistry, drawing, and caligraphy. Instruction is also given in singing, gymnastics, and stenography; but these branches are not obligatory.

The lectures in the three lower classes are strictly popular, and must be accompanied by ocular demonstrations.

In the three upper classes of the higher schools the instruction is given in a more scientific form; the subjects of study, however, remain the same as in the lower school, with the exception that elementary mathematics take the place of arithmetic, and that the theory of machinery is added as an obligatory study, and modern languages (Italian, French, and English) as non-obligatory.

The number of independent and fully organized "real" schools, enjoying the rights of public schools, was 32, in 1859, the number of scholars 9,989, and the number of masters 329.

As regards studies and discipline, the organization of the "real" schools is the same as that of the gymnasiums. The number of scholars in one class must not exceed 80, and only 50 must participate in the drawing lessons under one master.

The school fees vary, according to local circumstances, from 8 to 20 florins yearly, and exemption is granted under the same conditions as in the gymnasiums. The admission fee is the same, and is applied to similar purposes.

The salaries of the masters are 630, 840, 1050, and 1260 florins, an increase of 210 florins being allowed every ten years.

The annual expenditure for a lower "real" school is from 8,000 florins to 11,000 florins, and for an upper "real" school from 15,000 florins to 20,000 florins, and is covered by the funds appropriated to these purposes in the various Crown lands, or when the schools are commercial institutions, they are maintained by the communes. Many of the schools are partly maintained by the communes and partly by public funds, the school fees contributing to swell these means.

The real schools are placed under the immediate superintendence of the State authorities.

Middle Schools for Trade and Industry.

To these belong (1) the commercial schools established in the provincial capitals and in the larger seats of industry, and in which instruction is given (mostly on Sundays, but also, to a certain extent, in the evenings of the week days) in the branches of knowledge most important to persons intending to devote themselves to commerce or industry. These schools have been founded either by commercial associations, by industrial unions, chambers of commerce, or private individuals. (2.) The trade schools, which are supported at the expense of corporations or communes, and are intended for trade and factory apprentices; and (3) special schools for certain kinds of labour, such as the weaving school in Brunn, and the sewing, knitting, lace-making, straw-platting, &c., schools, instituted by the Central Committee in Prague for the improvement of the poorer classes in the Erzgebirge.

In the year 1859 there were, in the entire monarchy, 70 such middle schools, with very nearly 11,000 scholars.

Critical Survey of the System of Primary Instruction in Austria.

(Extracted from the Annual Report for 1866–67 of the Ober Real Schule in the Third District of Vienna.)

* * * Never did the cry for a better system of national education in general, and for improved system of professional education in particular, resound more loudly than after the terrible events which fell so heavily on our country about a year ago. The dictum that "not the needle-gun, but higher national education, conquered us," pronounced by a man of deep insight and knowledge, struck home so forcibly that it was repeated on all sides, and became almost a proverb among us. Radical changes were clamoured for, and in their zeal for improvement people seemed to forget that there was any good at all in the established system.

The popular schools, in particular, with the system of repeating schools attached to them, and the trade schools, but very recently introduced, were denounced as being utterly out of keeping with the demands of the times, and not reform, but a thorough revolution, was asked for.

In general, salvation was believed to reside in the attempt to introduce into these schools a number of new, and, no doubt, very useful, subjects, but no inquiry was made as to whether the time allowed in the school for the elaboration of these undeniably useful materials would suffice, so that they might lead to really fruitful results, or whether, should the time suffice, the mental capabilities of the scholars were such as to enable them to digest and assimilate the new pabulum offered. Some enumerations were made of branches of knowledge with regard to which popular education was, or was supposed to be, deficient. It seemed as though the public thought they could not stuff a sufficient amount of material within the framework of the schools; but all the while they forgot that it is not what is taught, but what is thoroughly well learnt, that is of use in practical life. If all that is taught in our popular schools and trade schools were really so learnt and assimilated that the pupils might, if necessary, make use of the knowledge in practical life, then our national education would bear a very different character, and the cry for improvement and development need not be raised so loudly.

According to their present organization, our popular schools comprise four classes, or yearly courses, which the children are expected to pass through from their sixth to their tenth year. Would it not be a highly desirable, and thoroughly satisfactory result, if the children of eleven years, when leaving their first school, should have been put thoroughly in possession of the fundamental truths of our religion, should be able to read fluently, with perfect understanding of what they read, and with proper emphasis, should be able to compose and to write down, without gross or frequent faults of orthography or inter-punctuation, the most commonly occurring business letters, invoices, &c.; should have mastered the elements of the grammar of their mother tongue, and should be able to solve with ease and confidence, in whole and fractional numbers, all such arithmetical problems as can be solved by means of the four fundamental rules of arithmetic? Would this not be as much as could be desired from children of the age of those who attend our popular schools? Certainly such results would be perfectly satisfactory.

We do not, however, mean to say that this sum of knowledge is all that is required for practical life in these advanced times. Stern necessity demands more, and a good deal more; but these demands cannot possibly be satisfied by forcing into the primary schools, with their four classes, a mass of practical and formal branches of knowledge, for the thorough imparting of which four years are far too short a time, and for the acquisition of which the mental capacities of such young children by no means suffice.

The course of instruction in the trade schools, according to the present arrangements, extends over two years, with seven hours' lessons in each week. In this time is taught German and caligraphy, the composition of business letters, &c., most commonly used in industrial life, solution of such arithmetical problems as are likely to occur in the various trades, together with the principles of book-keeping by single entry, the elements of geography with reference to commerce and industry, the elements of natural philosophy, mechanics, and chemistry, and, finally, linear and free-hand drawing, and modelling. Does not a

young artisan who has really acquired the knowledge here enumerated bring with him to his calling a very respectable and useful amount of instruction? Or will he not find frequent opportunities of turning it to account in his trade? Finally, should the increased preliminary knowledge of the scholars give reason to hope that the instruction imparted in the trade school might govern further than at present, would it not then be time enough to expand it so as to answer to these requirements, without entirely revolutionising it?

An impartial consideration of the subject cannot fail to show that neither our popular schools nor our trade schools are in their present form so inadequate to the duties demanded of them, as is maintained by many who have not sufficiently examined the matter. It will on the contrary be allowed that the fundamental parts of the organization of both these classes of schools give proof of knowledge, insight, and good-will in the founders.

If, in spite of the correct views that prevailed at their foundation, they do not effect as much as even with their present organization they might, there must be reasons independent of this, which prevent the development of the sound kernel which they enclose, and the putting forth of the blossoms which might be expected from them, and we would ask permission to dwell a little on these reasons. In so doing we may indeed lay ourselves open to the accusation that we say nothing new, but merely repeat what has been said again and again. But as the evils nevertheless continue to exist, our animadversions, though they may contain nothing original, cannot be considered as uncalled for.

First as regards the popular school. It labours under the great disadvantage that in the large towns at least, the children are sent to it at far too tender an age. The parents forced to seek by out-of-door labour, the means of supporting their families, have not time to watch over their little ones, or there may be other reasons which render the care of the children very burdensome, and they are sent to school as early as possible. Here they are in safety for some hours in the day, and the parent's mind is relieved of much anxiety. But for such purposes the infant schools were founded: the popular school ought not to be thus used.

It is often asked, why so? What harm can it do? At all events the child learns to sit still, and that is already something gained. But such gain is purchased at too great a cost when it be considered how much children under six years of age, whose tender frames require all the air and exercise they can get, must suffer in health by the enforced quiet and restraint, and close air of the school-room for several hours in the day. But in addition to this, the increased numbers thus accumulated in the lower class of the school, the very class in which the teacher ought to be able to occupy himself with each individual child, must act very detrimentally on his powers of teaching.

The over-crowding of the classes in our popular schools is one of the greatest evils under which they suffer, and is quite sufficient to paralyze the activity of the most efficient teacher. It must not be forgotten that the children with whom he has to deal are to be educated and instructed. By merely saying out the lessons to them, he will achieve nothing. Such teaching will do in high schools, where the pupils are young men, who are already sufficiently developed, and well informed, to know that it will depend upon their own attention and industry whether or not they shall derive benefit from that which the Professor puts clearly and distinctly before them, and who possess, or

ought at least to possess, firmness of character enough to go through the mental labour required for the acquisition of knowledge. With children it is very different; with respect to them the teacher cannot rest satisfied with having placed before them the materials for their use. He must before he makes a second step in advance, ascertain if, and in how far, the lesson already given has been taken in, and retained in the memory. Everything must here be brought to a termination, and the younger the children are, the less can they be left to themselves. Even when the lesson has been thoroughly understood and remembered, all is not done, the teacher must find for each child opportunities for practising what has been learnt. That such practise, as for instance, giving a verbal account of what has been read, repeating rules that have been taught, making calculations without the use of the slate, &c., is only possible when each scholar can frequently be called upon, is a matter of course, and the greater the number of children in the class the fewer must be the opportunities of practice afforded them. This is the principal reason why young people in this country have far less skill in expressing their thoughts, far less facility of speech, than the young people of other countries, and more especially of Germany. While there the number of pupils in a class is more frequently below 40 than above 60, in our schools it often reaches 100, and more frequently exceeds this number, than sinks to 80. Consequently as the possibility of the teacher occupying himself with the individual scholars diminishes in proportion to the increase in their numbers, it follows that in the German schools the pupils may be put through their essential practise three times oftener than the pupils in our schools. That threefold practise does not remain without increased effect is not surprising.

Another very great evil that arises out of the overcrowding of our school classes is, that it leads to a fearful increase of inattention and decrease of interest in the lessons. The greater the number of pupils, the greater the difficulty of rivetting the attention of all during the time of instruction, and the smaller the chance that the children will, by study at home, endeavour to fix more firmly in their memories what they have learnt at school; for are they not the surer of not being called to account for any shortcomings, the greater the number present in the class?

Instruction given in an overcrowded class is merely an appeal to the good will and the sense of duty of the scholars, as to whether they will avail themselves of the given opportunity of learning that which will be useful to them through life, for the enforcing of such duty which is so essential, nay so absolutely necessary during childhood, becomes impossible, when the teacher is unable to give his attention to each child. Indeed, an overcrowded class is a place in which scholars learn systematically for long years to sit still on a bench, caring nothing for what is going on around them, but, as the lively spirit of youth cannot remain long inactive, letting their fancies roam freely abroad.

From this state of things springs a moral evil greater in its effect upon the subsequent life of the school child. A boy who has learnt by the experience of years that he may be guilty of a dereliction of duty, without incurring the risk of punishment or reprimand, because circumstances favour the concealment of his shortcomings, will carry over with him into his future life this fatal habit of allowing himself to swerve from the path of right as often as he thinks he has a chance of escaping detection. What a baneful influence this must have upon the development of character hardly needs to be pointed out.

Another defect in our schools is that the four years, which as a rule are allowed for passing through the four classes, is far too scanty time for the proper elaboration of the materials given. If we take into consideration all that has to be learnt in this short period, and reflect that children of ten years of age are expected within four years (in each of which he can but count 200 school days), so to have mastered these varied subjects as to make them their own for the rest of life, and to make this knowledge the basis of their actions, it must be allowed that far too great demands are made upon the weak, and only gradually unfolding powers of the children, and this state of things appears in a still more unfavourable light when it is considered that a great number of the subjects of instruction belong to practical science, as may be seen by the books in use in the schools. It is not the elements of religion, the mother tongue, and arithmetic which in the present day form the chief subjects of instruction in the popular school. Children who can neither read fluently, nor write tolerably decently or correctly, are taught natural history, natural philosophy, geography, history, technology, &c., &c. Nay it has recently been seriously proposed that instruction should be given in these schools in statistics, jurisprudence, and constitutional law, national economy, &c., &c., and that the scholars should besides be taught military exercises, and how to use arms.

Let me not be misunderstood as meaning that such knowledge as I have alluded to would be injurious to our growing youth. Such is not my meaning. But firstly, no more ought to be put upon the scholar than he is able to bear, and no more mental food should be given him than he may reasonably be expected to digest. Secondly, everything ought to proceed gradually, proper time being allowed for each thing. There is as regards the strain of the mental powers a limit of elasticity, like that which prevails in the physical world, going beyond which leads not to strength, but to weakness and exhaustion. Let therefore the instruction given to children from their sixth to their tenth year be adapted to the capacities of that age: be such as can possibly be grasped.

Another evil attending the introduction of the practical sciences into the primary schools is that in the greater number of cases the persons through whom the knowledge is to be imparted are incompetent for the task, and who, taking into consideration the training they have had, cannot be expected to be competent. By saying this I do not mean any reproach to our school teachers. But it is my conviction that if subjects such as those in question are to be taught really efficiently, the teacher must be the more thoroughly acquainted with them, the weaker and more immature are the minds to which he is to impart the knowledge. The notion that to give the first lessons any one will do, has already caused much mischief. In the gymnasium, where in the 7th and 8th classes the boys are already much further advanced in culture, it has long been acknowledged that logic and psychology had better not be taught at all than be taught by persons not fully competent. . . . . .

Let then the first four or five years of our public primary instruction be devoted to imparting and strongly planting in the minds of the children such knowledge as is adapted to their age, and as will serve as a sufficient preservation for those who wish to continue their education in a middle school, and for those who when they have attained the proper age mean to enter a trade; let there be established burgher schools in connexion with the popular schools, which shall impart to the scholars from the age of 10 to 14, according to a well organized

and progressive system, all that it may be desirable for them to know, and which their powers will allow them to acquire.

Only when such burgher schools shall have been established in sufficient number, and have received a development in accordance with the growing requirements of practical life, will it be possible to guide our youths into paths that will answer to their mental faculties, and which are united to and sufficient for their future position in life.

Do not let us drive the young people destined for the middle schools at too early an age into those establishments. Here also the subjects to be studied in succession demand adequate physical and mental maturity. How many a gifted and healthy boy has been sacrificed by the vanity, or the ill-considered economy of parents, which have induced them to force on his studies within too short a space of time.

As a rule, also, the children are kept too long in school. The ordinary time in the popular schools is indeed fixed at only two hours in the morning, and two hours in the afternoon. But these are followed by the hours of repetition, or the so-called "after hours," and in addition to this one hour is very frequently given to drawing. This makes six hours daily, which are to be spent seated on a school bench, and not always in a very comfortable position. With respect to girls there is, in addition to the four hours in the popular school, the work school, or industrial school to be attended, and which claims at least two morning hours, but also frequently two further hours in the afternoon. Then there is the time devoted at home to learning the lessons for the school, besides in many cases to practise on the piano, or to learning some foreign language.

During all this time the pupils are made to sit still. The parents rejoice that their children are kept so long employed, and are well taken care of the while. But what a baneful influence this unnatural restraint must have on the health of the children may best be learnt by observing so many of our aged officials, whose regular work (began at a time also when the body has attained its full development) keeps them seated at the desk only six hours a day.

But it is not only on the physical development that this daily restraint acts detrimentally; the mental faculties also are injured by it. To keep the attention of children between the ages of six and ten years, awake for three consecutive hours must necessitate a strain which cannot but be hurtful in every way. With the best will in the world the children cannot attend so long, and thus the attempt to give instruction beyond the child's power of taking it, becomes a most fruitful source of inattention, and exercises a most damaging influence on the whole course of education.

As the circumstances of life in a town are once for all such as render it very desirable for parents to give their children into the care of the school for as long a period as possible each day, we should at least so arrange matters that no more than two consecutive hours should ever be devoted to subjects requiring mental exertion. The remainder of the time which the children spend at school should be given to gymnastics, singing, and other musical exercises, but always under the guidance of the teachers. Upon the whole the physical development of our young people deserves far more attention than has hitherto been given to it.

If all the defects in our popular schools which I have touched upon were remedied, and this might be done without any important change on their present organization, we should soon see their activity yielding more satisfactory fruits; although much more might still be said on

this subject, I will now rather proceed to point out the reasons why our trade schools also fail in producing the fruits that might be looked for from them.

One of the principal reasons is the want of preliminary knowledge in those who enter the schools. To this it may be replied: "You yourselves grant admission to the scholars, and on condition of a preliminary examination determined by you. How then can you complain of want of preliminary knowledge? If the examination be not passed satisfactorily, why admit the candidate?" This reproach would no doubt be deserved by us, if the trade masters would refuse to take as apprentices any young people but those who have attended a lower "real school," or such a burgher school, as we desire to see established, and have passed through them creditably; for the object of these schools is to furnish future trade apprentices with that knowledge which it is required that a pupil of a trade school should possess before entering the latter, and without which the instruction given in the trade school can hardly take effect. But what is the real state of things among us? Such scholars as give evidence in the popular school of special talent, or particular industry, and of a desire to learn, are handed over to the gymnasiums, as a preparation for the universities. The fact of a promising scholar seeking admission into a lower "real school," after having finished the course in the popular school, is of rarer occurrence, so that in Vienna at least the "real schools" are peopled by the least gifted and least industrious scholars from the highest class of the popular schools, whose parents, generally of a better class, and pretty well off, are wise enough to wish them to be usefully occupied until the time arrives for their being apprenticed to some trade. These scholars, however, come as little up to the mark in the "real" school, as they would in the gymnasium, and are the cause of the yearly recurring phenomenon, that half the scholars in the first class fail to reach the appointed goal. Something, however, they do learn, and the time until their entrance into a trade is at least not spent quite uselessly. Indeed these pupils, when their apprenticeship commences, and they in consequence begin to attend the trade school, prove, in spite of their previous failures, our best scholars, so advantageous to them is even the deficient amount of knowledge previously attained.

Of those scholars who complete satisfactorily the course of instruction in the lower "real" school, the most advanced move up into the upper real school, and the less promising generally turn to commerce, not to industry. Trade school scholars who have completed the course of the lower real school are among us at least of very rare occurrence. The preponderating mass of our scholars is composed of young people from the country who have there attended some small school, and of former pupils of our parish schools (*Pfarr hauptschulen*), who have either shown so little wish to learn, that their parents have not thought it worth while to send them to a lower real school, or who have been prevented by indigence from attending such a school.

Now to attempt under such circumstances to make submission to a rigorous preliminary examination the condition of admission in a trade school, would be to reduce the number of scholars into such a minimum, as would render it useless to keep up the school. All therefore that we venture to demand of candidates is reading, some degree of proficiency in writing, and a still smaller degree in arithmetic.

The first, or preparatory year in our schools must therefore be scrupulously limited to teaching with the utmost care, and with judi-

cious selection, those subjects most important to artizans, &c., which the pupils ought to have learnt in the lower real school, before their entrance into the trade school. There thus remains only the second yearly course of the trade school (supposing the pupil to remain full two years, which is very rarely the case) in which to impart that special industrial knowledge, which it is the object of the school to teach. But a school year has only ten months, consequently at the highest forty-four weeks, and each week has only seven school hours.

That with scholars possessing such qualifications as have been described, and with so short a time for instruction, the schools have by the exertion of their utmost powers produced all the results that are possible, has been proved by the annual examinations.

The scholars of the popular schools, who on leaving the fourth class either from want of means, or from want of industry, or of ability, fail to enter a lower real school, forget in the most cases, before their apprenticeship begins, the little that they had learnt, and become quite ineligible for the trade school. But had these scholars been allowed to remain longer in the popular school, their parents would probably have let them attend there until their apprenticeship began, for although unwilling or unable to send the children to a higher school, the parents would probably rather see them employed at school, than running about the streets in idleness.

These considerations show how very important it is for the success of the trade schools that our parish schools should be developed into burgher schools proper. Not until such schools shall have been established in sufficient number, can a better use of the instruction given in the trade schools be confidently reckoned upon. The "real" schools will never be able to effect this on account of the expenses unavoidably connected with attendance at this class of school, and which place real obstacles in the way of indigent parents, while to others, who would rather see their children waste their time in idleness, than make any sacrifices for their education, and who are incapable of understanding the immense importance of that education, the expense affords a convenient excuse. Attendance at school continued until the commencement of apprenticeship is thus an urgent necessity for the prosperity of the trade schools.

Another reason for the failure of these schools to fulfil what was expected of them in spite of the zeal and good will evinced by the masters, is the irregularity of attendance in the schools. This much to be deplored evil again springs from two causes. The first is the indolence and lukewarmness of the master traders, who, instead of fulfilling the duty that devolves upon them as representatives of the parents, of encouraging, and even enforcing regular attendance at school in the case of their apprentices, and stimulating them to industry and attention, on the contrary treat the matter as if it were of no importance. The second reason is want of industry in the apprentices themselves. It is true only such apprentices are admitted as scholars in the trade schools, whose masters give a written assurance that the apprentice will be allowed to attend during the entire school year, without interruption all the lessons given; it is true that the masters are requested to inspect at least once a month the book of attendance, which is given gratuitously to every pupil on entering, and to attest by his signature that he has seen it; but of what use are the most excellent arrangements, when they are neglected? One day the apprentice is required during school hours for such a thing, another day for something else. The inconvenience to the master arising from regular

attendance is more than he cares to submit to, and in spite of his written promise, the apprentice is kept from school. That the necessary consecutiveness of the instruction is lost, when the scholar only attends irregularly, that he is no longer able to follow and understand the teacher, who has moved on during his absence, and that thus all interest in the subject is lost—is not taken into consideration.

Frequently it is a want of insight and conviction as to the necessity of increased and increasing knowledge in the present day that is the cause of this indifference. The masters say that they know nothing of all these matters themselves, and yet they have become masters. Why then should the apprentice know more than his employer?

In more favourable cases the apprentice is allowed to attend the school undisturbed, if his own industry and love of knowledge induce him to do so, but no master goes so far as earnestly to promote attendance. And yet this support of the school by the influence of the masters is of the utmost importance, for it is folly to expect that apprentice lads should be so full of zeal for improvement that they will without encouragement or strict supervision, voluntarily hasten to the school when tired by the labours of the day. Learning always requires exertion, and such exertion becomes the more difficult the more a person is exhausted by previous work, and the less the amount of previous knowledge he brings to the task. With such a very small amount of previous knowledge which the preponderating number of our apprentices possess, their indolence as regards all kinds of mental exertion, can only be conquered if the endeavours of the schoolmaster be seconded by constantly co-operating home influences. Without this support of home authority, indeed, it is hopeless to expect the schools to overcome the great obstacles that obstruct their path.

If we weigh the low state of education of the scholars, the absence in them of the habit of conquering mental indolence, the difficulty with which they comprehend, the indifference of the majority of master traders as to any improvement in themselves, or in their apprentices, nay, the positive opposition frequently made against all that the school is endeavouring to effect; if, I say, we weigh all this against the present form and constitution of the schools, and allow ourselves to take an unbiassed view of the matter, we cannot fail to come to the conclusion, that the shortcomings that we so much deplore are to be attributed far more to outward circumstances than to any intrinsic defects in the schools themselves. Though I would by no means hold up these schools as models of perfection, yet, even as they are constituted, they might achieve much good if the attendance of the scholars were more regular, while every endeavour to reform and improve them will remain without effect, as long as the evils to which I have pointed remain unabated. All that can at present be done with any hope of a useful result, may be comprehended in a few sentences.

1. Let the number of the schools be increased in as far as the means will allow, so that that overcrowding of the classes, which must inevitably act injuriously, may be avoided, and that attendance may be facilitated by the greater proximity of the school to the home.

2. Let the weekly hours of attendance be increased, by at least two, to be devoted to drawing and modelling. Two hours a week are not sufficient for practice in these arts, which are of so much importance in a great variety of trades.

3. Let endeavours be made to unite, as far as possible, apprentices only belonging to one and the same trade, or to trades bearing some affinity to each other, in the same division of the school, so that when

they have gone through the preparatory course, the instruction imparted to them may be as specially adapted to their trade as possible.

4. Let the most earnest endeavours be made to render more stringent the laws and rules which bind masters to send their apprentices to school, and to cause them to be carried out. Persevering, uninterrupted attendance at school is the first condition of success, at least as far as the great majority of scholars are concerned.

5. Let special divisions be constituted for journeymen, who, being more mature in mind, and having a more correct appreciation of the advantages of knowledge, are more likely to avail themselves with zeal and perseverance, of the instruction offered, than the more giddy and less developed apprentices. In these divisions for journeymen a free choice may be allowed of the subjects to be learnt. The advantage to the trades will be the same, whether it be the apprentices, or the journeymen who are made more competent for their calling.

An Opinion as to the Reforms required in the Technical Middle Schools of Austria.

(Extracted from the 12th Annual Report of the Communal Upper "Real" School in Wieden, 1867.)

In addition to the popular schools, it is more especially the technical middle schools which are urgently in need of an organization. The draft of an organization of "real" schools and gymnasiums, which dates from the year 1848-49—the only honourable monument we possess of the creative activity of the Government within the sphere of education during the last eighteen years—did not, indeed, forget the institution of technical middle schools, and laid the foundation of our "real" schools. On that occasion the necessity was also pointed out of turning the fertilizing stream of the practical arts and sciences into the domain of the industrial and trading middle classes, in order that the inexhaustible resources of Austria might be rationally cultivated on a large scale. But notwithstanding this acknowledgment of the claims of the classes in question, very little has as yet been done in this direction. The revenues of the State being employed for other purposes, there was never public money enough left to found technical middle schools on such a scale as the nature of the existing circumstances called for, and thus it is that with the exception of the "real" schools, and a few commercial schools, which, by the bye, have mostly been established by private means, or with the aid of commercial funds, we possess no educational constitutions corresponding to the urgent want of instruction in the practical arts and sciences.

The extraordinary neglect of this branch of public education will be best seen by a comparison between the numbers of existing gymnasiums and of "real" schools. At the present time there are within the entire limits of the Austrian monarchy 202 gymnasiums, and only 71 independent "real" schools. Whereas it would be more natural, and more in accordance with the actual needs of the people, that the proportion should be reversed. There are, no doubt, persons who, in order to gloss over this really deplorable state of things, will point to the trade schools, which are supported by the charitable contributions of chambers of commerce, of corporations, and of communes, but inde-

pendently of the fact that the sorry manner in which these schools have to carry on their existence, very strikingly illustrates our statement of the neglect to which industrial education is subjected, we must observe that according to their organization these trade schools are rather industrial perfecting schools (*fortbildungs schulen*), and can lay no claim to being real trade schools.

However, it is not only the want of technical middle schools, but, in like measure, the faulty organization of the existing schools, and, still more, the very one-sided reform that is being adopted as the rule for the "real" schools (all of which open but very sad prospects for this branch of public instruction), which have induced the staff of teachers in the Wieden real school to state in detail, out of pure interest for the matter, their views as to the organization of technical middle schools in general, and that of the "real" schools in particular, and to point out the fatal results that would ensue from a one-sided reform of the "real" schools.

According to the draft organization for "real" schools and gymnasiums, the "real" schools hold a position between the popular schools and the technical institutions, and their object is to impart, in addition to a general education (which they endeavour to give, with but little use of the ancient classical languages and literatures), a preparatory education of middle degree, enabling the scholar to pursue a trade or to enter a technical school.

The fact that a great number of the pupils of the "real" schools, either while still attending them, or after the conclusion of the course, join a trade, subsequently led to the introduction of a still more practical character into the plan of studies, the art of building, and of the construction of machinery, being added to the programme.

In the original plan of studies in the "real" schools, a so-called practical course of one year was projected, which was to be in immediate connection with the highest class in the lower "real" school, and which was intended to carry on the education of those who meant to enter a trade. Had this practical course really come into existence, a suitable plan of studies introduced into it would have obviated many of the defects in the present plan of studies in the "real" school, and there would be no reason to complain that by attempting to teach at one and at the same time two different goals, neither can be fully attained.

The draft organization already drew attention to the fact that the whole of the general education, as well as the special instruction proposed to be given by the "real" schools, was very indefinite, as these schools were to serve for so many, and as to worldly position, widely different classes. In order to remedy, as far as possible, this defect, the draft in question proposes the founding of a great number of schools of the kind adapted to the special needs of the localities in which they should be established. How this suggestion has been carried out by the Government within the last eighteen years may be seen by the above comparison between the number of gymnasiums and of "real" schools.

Quite recently, however, the endeavours to reform the "real" schools, so as to make them answer more fully to their purpose, have become more active and more earnest, and manifold suggestions have been made. Thus, for instance, it has been proposed that Latin should be introduced as the obligatory language of instruction, because only through the study of the classical languages can thorough culture be attained. In order to prove the correctness of this statement,

pupils who have gone through all the classes of the gymnasiums are compared with the scholars of the "real" schools. The formal linguistic culture of the former is considered to be superior to that of the latter, and as, with the exception of Latin and Greek, the same subjects are taught in both schools, it is supposed to be confirmed by experience that the absence of Latin is the cause of the inferior results obtained in the "real" school.

It is not our object here to inquire whether the assertion that only through means of classical languages can thorough mental culture be attained is so absolutely unassailable as it is believed to be; but we must be allowed to investigate critically the reasoning we have just alluded to, because it leads to a very incorrect judgment of the "real" schools, both as regards their results, and as regards their deficiencies.

Those persons who draw from the comparison between the two school systems conclusions adverse to the "real" schools forget that the course of study in the gymnasiums extends over two years more than in the other schools, and that these additional years comprise the very period when independent thought begins to develop itself in youth; that in a greatly preponderating degree the pupils of the "real" schools are recruited from among those classes whose schooling does not go beyond that received in the popular school; that in consequence that essential part of education that is received at home is frequently wanting in their case; further, that the study of modern languages is not obligatory in our "real" schools, that the teachers have very rarely made philological studies, and that the assistance afforded to the study of the German language by the knowledge of other languages is consequently wanting.

In addition to this, while the maximum number of scholars in one class in the gymnasiums is fixed at 50 in the "real" schools, 80, or almost double the number, is permitted.

Further, if the essentially educating power of certain branches of study is to be judged by the results obtained in the schools, it is important that the number of hours weekly allotted to these branches should be taken into account.

Now, the tables appended to this statement show that mathematics, geography, history, natural history, and physics have, in both schools, allotted to them exactly the same numbers of hours, but that the time devoted to the study of language in the gymnasiums is four times greater than in the "real" schools, and greater in amount than that allowed to all the other branches together in the gymnasium; the superiority of the pupils of these schools as to style and linguistic knowledge is thus explained by the mere number of hours given to linguistic studies, and as regards the mental culture which is acquired together with this, it may be questioned whether, if the same amount of time, or even only half the time, that is allowed to Latin were given to any other subject, as, for instance, mathematics, the same result would not be obtained. A comparison between the entire number of hours given to instruction in the two schools shows that the collective number in the "real" schools in six years is almost equal to that in the gymnasium during eight years.

If, in order that all circumstances may be taken properly into account, the hours given to free-hand drawing and geometrical drawing in the lower "real" school be set aside, the result is a still greater mental pressure on the scholars of the "real" school, compared with those of the gymnasiums. If all these disadvantages under which the "real" schools suffer be taken into consideration, the general edu-

cational results obtained by them may be said to be highly satisfactory, and, therefore, it is only requisite that the evils and obstacles alluded to should be removed: that is to say, that eight years of study should be substituted for six, that learning some modern foreign language should be made obligatory, that no more than 50 pupils should be allowed in one class, and that a more suitable distribution of the subjects of instruction should be introduced, and the institutions in question will soon take equal rank with the gymnasiums.

Those voices which clamour for the introduction of Latin cannot be attended to with reference to the re-organization of the "real" schools, if for no other reason, because Latin and a modern language could not both be taught without overburdening the scholars, and a living language is of far greater importance than Latin to the scholars of these schools, who are preparing themselves for a technical career.

The draft organization remarks forcibly and strikingly with respect to this question, "Modern literature is made the basis of the general education to be given, because in these schools the object is to reach the goal by the shortest road, and modern literature has undoubtedly attained a development which makes it also the bearer of true humanitarian culture, and it offers sufficient means for imparting such culture."

To this we have nothing to add, but that the reading of the ancient classics in good translations might be used as an auxiliary means of education, in conjunction with those offered by modern literature.

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We feel ourselves urgently bound to declare that all reforms in the "real" schools will be nothing more than patchwork, if the educational needs of the industrial middle classes be not at the same time attended to by the institution of compensatory establishments.

How these ought to be organized we shall point out in the sequel; in every case they must be distinguished from the present "real" schools by a more realistic practical tendency, and by a less strictly scientific treatment of the subjects of instruction.

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If the reform in the "real" schools be contemplated from a more general point of view, and an attempt be made to satisfy equally all existing wants by a suitable gradation of popular schools and technical middle schools, or trade schools, then the reform cannot fail to lead to happy results, for by a suitable gradation the stream of those who intend to devote themselves to industrial activity, and who wish for that purpose to extend their knowledge, will be properly divided, while at present all those who are not in a position to go to the university, or to the technical high school, and who yet wish to acquire a degree of culture exceeding that which the popular school can impart, are obliged either to resort to a "real" school, or to a gymnasium, or to a so-called "real" gymnasium. It would therefore be a very great mistake to conclude from the large number of pupils attending these schools, that only such are urgently wanted. On the contrary, the extraordinary diminution in the number of scholars in the upper classes of the schools, and the overcrowding of the lower classes, show distinctly that the majority of the scholars only resort to these schools because there are no others in existence which would suit.

The fundamental lines of the organization of instruction in the technical middle schools ought to join on to the popular schools, and ought, as a matter of course, to be adapted to the educational wants of the immediate representatives of handicraft, commerce, and industry. What we want is therefore (1) schools which shall serve as places of

education for the working handicraftsmen, and the aim of which shall be to diffuse greater intelligence among this class; (2) schools which shall satisfy the educational requirements of those who hold a medium position between artisans and engineers, and who represent in fact the officers of the industrial army, we mean foremen, overseers, polishers, machine fitters, mechanicians, &c., &c.; (3) schools that shall prepare pupils for the technical high schools, and which by aiming at giving a thorough general education on the basis of modern literature, shall form the educational centres for those middle classes which hold a high social position, until a system of higher burgher schools has been instituted.

According to what has been said the gradations of the schools would be as follows:—

1. Burger schools, with which the perfecting trade schools (*gewerblichen fortbildungs schulen*) would be immediately connected.
2. Trade schools.
3. "Real" schools.

The detailed organization of these schools cannot in Austria, where the state of education among the people varies so much, and where the differences of language also offer many obstacles, be uniform. In our proposals we hold more especially in view the educational interests of the German Austrians, and of the city of Vienna in particular, for the greatest community in the empire ought undoubtedly to be the first to establish suitable educational institutions for its citizens, besides which, its example is sure to be followed by the other towns of German-Austria.

The Burgher Schools.

These should consist of eight yearly courses or classes, and should impart instruction from the 6th to the 14th year, that is to say, within the period during which the physical development is still too little advanced to allow of the children beginning their apprenticeship to a trade. The Burgher schools should constitute the basis on which the perfecting trade schools and the trade schools are to build further.

The distribution of the subjects of instruction should, during the first five years, be quite the same as in the popular schools, so that the boys from the popular schools, as well as the burgher schools, may, when they have completed their 11th year, go over to the gymnasium, or to the "real" school. The courses of the 6th, 7th, and 8th year should go deeper into the subjects already learnt, should extend the general information, and at the same time impart the elements of drawing, in order to prepare the pupils for the perfecting trade school, or the trade school proper.

In order not to overburden the pupils during these tender years, the number of hours a week during the two first years should not exceed 20, and during the subsequent years should be fixed at 30, comprising in this number gymnastics and singing.

Perfecting Trade Schools.

The organization of these schools will be analogous to that of the trade schools, which are at present supported by Chambers of Commerce and Industry, and we shall not therefore enter into particulars concerning them.

Trade Schools.

The proper organization of trade schools offers greater difficulties than of "real" schools and burgher schools, because while the two latter have definite and determined aims, the trade schools cannot lay down the same definite plans on account of the great variety that exists in industrial pursuits. For instance, a very wide spread opinion prevails that the schools should prepare the scholars specially for the trade of their selection. This could not, however, be done satisfactorily, unless a school were established specially for each trade, a plan which would be found unfeasible in practice. It would, no doubt, be practicable, and indeed desirable that special schools should be established for certain industrial pursuits of great local importance, but due discretion ought always to be observed as to the founding of such schools, for schools can never take the place of actual practise, and their aim ought therefore merely to be to impart to the future artisan such theoretical knowledge as important to him with reference to his calling. A further difficulty connected with the organization of trade schools, is the short time which the scholars are able to devote to the acquisition of the necessary knowledge, as it is important to them to begin their actual career as early as possible.

Taking all these difficulties into consideration, it seems to us that the trade schools should be divided into two categories, *i.e.*, into general trade schools, and into schools for special branches of industry.

In the general trade schools the instruction imparted should be adapted to such groups of trades which according to their nature bear some affinity to each other.

In this case a certain uniformity of organization will be attainable, while the organization of the schools for special branches of industry must conform to the particular wants of the special branch for which they are destined. For these schools a satisfactory plan of studies cannot be made out without the aid of men belonging to the special branch of industry concerned, and we cannot therefore here enter into any of the details.

In making a draft of the plan of studies for the general trade schools, it will be above all necessary to take into account the fact that those trades for which a more thorough theoretical education is required, may, notwithstanding the differences between them be collected into the following groups:

Building trades, mechanical trades, chemical trades, and artistic trades.

These groups, with exception of the artistic trades, all require in common a certain amount of theoretical knowledge, particularly in mathematics and the natural sciences, and indeed even the artistic trades cannot well do without some acquaintance with the natural sciences, and as this knowledge is imparted in the last three courses of the burgher schools in a very slight degree only, this task must be undertaken in the first yearly course in the trade school, the second year's course being adapted to the instruction required for each group in especial. In accordance herewith, the trade schools would have to comprise two courses of one year each, and to be organized so that admittance into them should follow the completion of the eighth year of the burgher schools, that is to say, they should be adapted to pupils having completed their 14th year. The pupil of the trade school would

thus be enabled to finish his school education at an age which would leave him time to learn his trade practically, before the commencement of his military service.

Wherever an independent lower "real" school exists, the two years of the trade school may be added on to this, and it will then constitute a trade school with five courses of a year each. Such schools would be more especially desirable for small towns which do not possess complete "real" schools, as the support of a popular school and a five class trade school would be less expensive than the support of a burgher school and a trade school with two classes or courses, and the popular school with the first three courses of the five class trade school, will be a perfect substitute for the burgher school.

For larger cities, as for instance, Vienna, which possess several independent "real" schools, it will on the other hand be economically more advantageous that trade schools with two classes should be instituted together with burgher schools, as these may more easily be brought into local connection with the reformed "real" schools; and this would lead to at least a partial saving in the number of teachers, and the necessity for the acquisition and maintenance of double collections of auxiliary apparatus, libraries, &c., and of separate localities for these, would be avoided, points which are well worth consideration in large cities, where, owing to the great distances, a trade school must be established in each district.

According to the plan we have drawn up, the first year's course in the trade school includes as obligatory subjects of instruction, mathematics eight hours a week, and physics, chemistry, descriptive geometry, and free-hand drawing, each six hours a week, the total number of lessons a week being thirty-two, and the subjects selected forming the common basis of all industrial pursuits which require a considerable amount of theoretical knowledge. The second yearly course will comprise a division for the chemical trades, one for the mechanical trades, one for the artistic trades, and one for the building trades; the average number of weekly lessons is fixed at twenty-four, the chief desideratum in these special classes being, that the scholar should make that which is taught so thoroughly his own, as to be able to apply it in practice, and numerous questions and problems connected with the subjects of instruction, should therefore be given to the pupils to solve, and the necessary time for working out their answers ought to be allowed. As every rationally cultivated man of business ought at least to be able to form a general conception of the various branches of industry, and their mutual relations, general technology has been included in the second year's course, as a subject common to the various divisions.

With respect to the division for the building trades, we have to observe that instruction in this division is only meant to be given during the winter months, that is from 1st November to 1st April, because, as is well known, during these months all building proceedings are interrupted, and other trades connected with building, such as the joiners, the locksmiths, &c., also stagnate. But in order that this arrangement may not curtail too much the entire time to be given to the necessary instruction in this division, it comprises two courses of half a year each.

This arrangement has the great advantage that the apprentices to the building trades may begin their practical activity one year earlier, but it is adopted specially for this particular division, and could not well be made to adopt itself to the plan of lessons in the other divisions; thus the lectures on general technology, for instance, must always be

so managed, that the matter commented on in the summer half year, should be gone over again in the ensuing winter half year, in order that the pupils of the building trades division, may have an opportunity during their two winter half years of hearing the whole of the subject. Further as only the general principles of the theory of mechanics, all of importance to the building trades, these must be treated of during the winter half year, and the theory of machinery during the summer half year.

Pyrotechnics, or the theory of heating has been added to the division for mechanical trades and building trades as an obligatory subject of study, because the application of fire and of heat in general occurring so frequently in connection with these trades, it was deemed of importance, that the fundamental principles of a rational use of fuel should be explained to the pupils. However, only three hours a week, and that exclusively during the winter half year have been devoted to this subject.

The leading points to be held in view with respect to the organization of the "real" schools, should be as follows:—

1. The object of preparing pupils for their trade should be set aside, as this will be the duty of the trade schools.

2. Instruction in languages should hold a more prominent position in the new plan of studies, and for this reason two languages should, as in the gymnasiums, be made obligatory subjects, but in this case they should be living languages.

3. Mathematics and the natural sciences should have at least as much time given to them as in the existing "real" schools.

4. Physics and chemistry should be reserved for the highest class in the "real" schools, and the number of lessons in mathematics should be increased in the last year's courses.

5. The number of lessons in drawing cannot undergo much change.

In accordance with these principles, the number of years of study should be fixed at eight, for the quality and quantity of matter learnt in the "real" school being equal to that learnt in the gymnasiums, the pupils of the former establishments cannot be expected to reach the goal in six years, which it takes the pupils of the gymnasium eight years to attain.

Rules for the Examination of Candidates seeking Admission into the Royal Imperial Polytechnic Institution in Vienna.

Until regular examinations as to competency (*Maturitäts prüfungen*) have been introduced into all the "real" schools, candidates for admission as ordinary students into the Polytechnic Institution, shall be subjected to examination in the subjects, and to the extent given below.

a. Mathematics.

1. *Arithmetic and Algebra.*—Ciphering in general, and calculation with common fractions and decimal fractions in particular; change of common fractions into decimal fractions, and continuous fractions, rule of three, reduction, chain rule, division; calculation, with logarithms; extraction of square and cubic roots of numbers; the rules of algebra;

the properties of products and quotients, of powers, radicals, and logarithms; divisibility of numbers; greatest common measure, and least common multiple; properties of common continued fractions; outlines of the theory of combination; Newton's binomial proposition; simple equations with one and more unknown quantities, equations of the second degree with one and two unknown quantities, and equations of higher degrees with one and more unknown quantities, in as far as they can be resolved into quadratic equations; simple indeterminate equations; arithmetical and geometrical progression; calculation of interest.

2. *Plane Geometry. a.*—Planimetry; congruence, similarity, superficial contents, and transformation of rectilinear figures, more particularly of triangle and square; properties of the circle; lines and angles of the circle; its relation to the triangle, to the square, and to regular polygons; its periphery and contents.

b. Gomometry and Trigonometry—The gomometric functions, their properties and mutual relations, and the more important formulas connected with them, particularly for the sums and differences of two angles, and for double and semi-angles; problems of the resolution of the triangle, and application of this calculation in given cases.

c. Analytical Geometry.—Proposition of the equations for the straight line and the circle in rectangular co-ordinates; problems relating to the straight lines and the circle; proposition of the equations for the ellipse, the parabola, and hyperbola from their definition; deduction of the principal properties of these lines, more particularly as regards the focus and the tangents.

3. *Solid Geometry. a.*—Stereometry; propositions and problems as to the relations between points, straight lines, and planes; properties of the parallelopipedon, of the prism in general, of pyramids, of regular bodies; superficies and solid contents of angular bodies; properties of the cylinder, the cone and the sphere, their superficies and solid contents, lines and angles on the surface of the sphere.

b. Spherical Trignometry.—Properties of the spherical triangle; problems for the solution of this; execution of the calculation in given cases.

In all these matters accurate understanding of the theory, as well as skill and certainty in the execution of the calculations is required.

b. Geography and History.

Geography.—Knowledge of the leading points of mathematical and physical geography, particularly of orography and hydrography; survey of political geography; knowledge of the most important branches of production, and of the internal relations of the leading countries; closer acquaintance with the political geography and statistics of Austria, particularly relating to the national and productive circumstances, and the state of civilization in the several crown lands.

History.—Synoptical knowledge of ancient history, more especially of Grecian history to the period of the downfall of the Macedonian Empire. As regards the history of the East, the development of the Egyptians, the Persians, and the trading colonies of the Phœnicians is more particularly to be held in view; the Hellenic states and constitutions during the heroic period; the wanderings of the Darians; the Greek colonies; the legislation of Lycurgus, and the Messinian war; Solon; the Persian war; the Peloponnesian war; the Theban war, and

the leadership of Thebes; Philip of Macedonia; Alexander's expeditions into Asia; the fate of the States which were formed out of the empire of Alexander.

Roman History up to the time of Augustus.—The constitution of Rome during the time of the kings; the Republican Constitution; the struggles between patricians and plebeians for equality of rights; the war with Tarento and Pyrrhus; the Punic wars; the Gracchi-Marius and Sulla; the first triumvirate; Julius Cæsar; the second triumvirate; Cæsar Octavian Augustus.

Survey of mediæval history, and more particularly of German history. Constantine the Great and the development of Christianity. The migration of nations and the founding of new empires. The Franks, Charlemagne. Dissolution of the empire of the Franks. The Saxon Emperors, especially Otto I, the Salic Frank Dynasty, Conrad II, Henry III, Henry IV, and Henry V. The Crusades and their consequences. The Babenbergs. Foundation of the power of the Hapsburgs. Charles IV and Wenzel. Sigismund and the ecclesiastical relations of his times. Germany under Frederick III and Maximilian I. The Italian republics of the middle ages.

More detailed acquaintance with the history of modern times, and more particularly with the history of Germany and Austria. Discoveries and inventions. The revival of art and science. The Reformation. Charles V, Philip II, and the Netherlands. The religious wars in France. Henry IV. The thirty years war. England under the Tudors, the Stuarts, Cromwell. France under Richelieu and Mazarin. The age of Louis XIV. The Austro-Turkish wars. Sweden under the Vasas. War of the Spanish succession. The northern war. Charles VI. The Silesian war and the war of the Austrian succession. Maria Theresa. Joseph II. The North American war of independence. History of the revolutionary period from 1789 to 1815.

c. Physics.

The requirements are in—

a. General knowledge: a perfectly distinct understanding of the fundamental principles of the science, and a knowledge of the most important phenomena in nature and of the laws that govern them, founded on experimental demonstration, and on elementary mathematical proofs.

b. Special knowledge: knowledge of the general properties of physical bodies, of the different forces working in them, of the various forms of aggregation, of the different degrees of solidity, of the laws of elasticity, adhesion, decomposition, crystallisation.

In general mechanics, determination and measurement, combination, and resolution (*zerlegung*) of forces from a single point of attack, or from several points, the momentum of revolution (*Drehungsmoment*) and its composition, the simplest and most important of the complex mechanical principles of the theory of motion, uniform and irregular motion, velocity, combination, and resolution of motion, curvelinear motion, centripetal and centrifugal force, gravity, and the motion produced by it, projectile motion, oscillatory motion, revolving motion, point of inertia, free axis of rotation, impingement of elastic and of non-elastic bodies, resistance of motion, motion of working power and of vital force.

Theory of the balance, absolute and specific weight, influence of

the earth's rotation round its axis on its form, and on the intensity of gravitation in different geographical latitudes, ebb and flood.

Fundamental principles of liquid bodies, form of the free surface and the conditioning causes, pressure on the bottom and the side walls of the containing vessel, and the practical applications to be deducted herefrom. Equilibrium in communicating vessels, the most important phenomena of capillary attraction, rising (*Auftreib*) equilibrum of floating bodies, determination of density by means of areometer and water poise, velocity of outflow under a constant amount of pressure, reaction of the jet and its applications, the shock of fluids, and the most important applications to water-wheels, turbines, &c.

General properties of elastic fluid bodies, measurement of elasticity, atmospheric pressure, and the measurement of this by means of different kinds of barometers, its variableness at different altitudes above the level of the sea. Mariotte's law and its most important applications; different kinds of air pumps. Determination of the specific weight of atmospheric air, and of the density of gases. Gay-Lussac's law: theory of the balloon, forcing pumps, siphons, &c. Laws of absorption, velocity of out-flow under constant uniform pressure.

Principal phenomena of magnetism. Outlines of the magnetism of the earth, magnetic point, magnetic axis, laws of distant effects of magnetism, methods of magnetising, paramagnetism and dia-magnetism.

Principal electrical phenomena, electrostatic induction, laws of distant action, and the production of such action by means of the revolving balance (*Drehwage*), the electroscope, the Leyden jar, and the condensator; electrophorical action, rapidity of the transmission of the electric condition, principal phenomena of contact electricity, laws of the gradation of tension, theory of the simple and complex voltaic jules, battery, current, physiological, thermal and chemical effects of the current. Principal features of electrolysis, the strength of the current, and its measurement by chemical effects. Effects of the magnetic current, galvanometers, multiplicators, &c. Electrodynamic and magnetic-electric induction, thermo-electricity, idea of the resistance of conduction, Ohm's law, and its most important applications, bifurcation of the current. The leading points in the applications of the laws of electro-magnetism to telegraphy and electro-magnetic motors. Atmospheric electricity.

Leading points in the theory of undulation. Different kinds of waves, reflection and interference of waves, particularly of the waves of sound, rapidity of sound, conditions of sound, musical tones and determination of the number of their vibrations, tones of tightly strung cords, of bars, of sound-boards (sound figures), and of columns of air, reverberation of sound, structure of the organ of hearing.

Elements of the science of light. Elements of the theory of shadows, principles of photometry, reflection by plane and curved surfaces; simple refraction on plane and spherical surfaces (elements of the theory of lenses), distribution of colour. Franenhofer's lines, principles of spectrum analysis, achromatic prisms and lenses, chemical effects of light, optical instruments of a certain construction (camera-obscura, camera-chiara, telescope, &c.), the eye and its structure, subjective phenomena of colour, and diaphragmatic phenomena. Rapidity of the transmission of light, the most important phenomena of interference and refraction, the fundamental phenomena of double refraction, polarisation by refraction and reflection, colour of laminæ, explanation of these phenomena by the theory of undulations.

Principles of the theory of heat; expansion of bodies by heat, the thermometer, conduction of heat; change of the state of cohesion, latent and specific heat, the elements of calometry, generation of steam, laws of the tension of steam, determination of the density of steam, vapour contained in the atmosphere, hygrometry, the steam-engine. Radiating heat and the means of measuring the intensity of this, laws of radiation. Phenomena of combustion, heat caused by combustion.

d. Natural History.

Mineralogy.

The candidate should be acquainted with the most important of those properties of minerals by which they are characterized, and in accordance with these to determine and describe the most common minerals, or those which are most important as to their uses. But the knowledge of a definite scientific system of minerals is not required.

With respect to the general portions of mineralogy (characterization, terminology) the examination will extend to:—

1. Crystallography, embracing the morphological properties of minerals. A knowledge of the six systems of crystals according to the uses on which they are based, and according to their sample forms, as also of the most common combinations of two or more forms will be required. The knowledge of crystallographic symbols, or of calculating and measuring crystallography, will not be required.

2. Mineral physics embracing the physical properties of minerals: divisibility, hardness, and specific weight; brightness, transparency, colour (idiochromatic and allochromatic) minerals, veins (*strich*); difference between minerals with simple and with double refraction, between magnetic and non-magnetic minerals; fusibility.

3. Mineral chemistry, or chemical properties of minerals; elements, combinations, equivalents, chemical constitution; difference between metallic and non-metallic minerals; definition of ores (sulphurous, oxygenated, and saline ores) of stones (silicate), and of salts (carbonate, sulphate, &c.).

A knowledge of the chemical reaction of minerals is not required.

Among the most common, and most important minerals, as to their uses in special mineralogy (physiography) are counted:—

1. From among the group of *metallic* minerals.

a. The metals occurring in a pure form.

b. The most important ores, such as iron pyrites, magnetic iron, iron glauce, red oxide of iron, brown iron ore, sparry iron ore, manganese, red ore of nickel, shining cobalt ore, copper ore, varicgated copper pyrites, copper glauce, red copper ore, malachite, lapis lazuli, sulphuret of lead, white lead ore, green and brown lead ore, tin-stone, shining silver ore, gray copper, red silver ore, cinnabar, sulphuret of zinc, lamellar calamine, sulphuret of antimony (*antimonglanz*), arsenical pyrites.

2. From among the group of *non-metallic* minerals.

a. Sulphur and graphite.

b. The most important stones: quartz, opal, feldspar, analcime, staurolite, mica, chlorite, talc, serpentine, steatite, horn-blende, angite, granite, vesuvian, cyanite, olivine, turmaline; also the most important of the precious stones; the diamond, corundum (sapphire and ruby), topaze, spinelle, zercon, beryl (emerald).

c. The most important salts; calcareous spar, aragonite, gypsum, anhydrite, ponderous spar, celestine, apatite, nitre, fluor spar, rock salt.

The candidate must be able to indicate the most important morphological, physical, and chemical properties of all these minerals, as also their most important uses, and the localities in which they are principally found.

The knowledge of a systematic nomenclature (as for instance that of Mohs) is not required, nor either the chemical formulas.

Botany and Zoology.

In botany and zoology the candidate is expected to be able to give a systematic sketch of each of the kingdoms, and to possess a knowledge of the most important plants and animals which enables him to distinguish and characterize them. By the most important plants and animals are meant such as are especially interesting on account of their frequent presence in our country, of their application in arts and industry, of their usefulness, or their injuriousness, of the conspicuous place which they occupy in the household of nature, or of their peculiar geographical distribution.

Plants and animals of this kind will be laid before the candidate for him to classify and characterize.

As more important subjects of examination may be mentioned:—

a. In botany; principal organs of the phanerogamenous plants; forms of the roots, the pedicles and the leaves; blossoms; various parts of the flowers; outer circle of petals, anther, stamen, pistol, and seed bud; survey of the different kinds of fruits; properties of the seed.

Characteristics of the cryptogamenous plants in general.

Linne's system.

Classification of plants according to the natural system.

Characteristics of the various classes of non-flowering plants, and the different orders of vasculiferous cryptogamia (*Gefafscrytogamen*).

Characteristics, affinities, geographical distribution and use of the most important families of seed-bearing plants.

b. In Zoology:

The principal functions of animal life, motion, sensation, nutrition, and propagation; indication of the most important organs connected therewith; the local position of the latter in the animal body, and their nature in general must be demonstrated on one of the higher (vertebrate) animals; influence of climate on animal life; division of the animal kingdom into classes (vertebrate, mollusca, &c.) indicating the distinctive characteristics of each; division of mammalia, birds, reptiles, and insects into orders. Distinctive characteristics of the various families of carnivora, of pachyderma, and of ruminata.

c. Geometrical and Free-hand Drawing.

Orthogonal projection; representation of straight lines and planes; graphic solution of problems relative to their mutual relations; representations of bodies bounded by planes; intersections of their surfaces; representation of conic, cylindrical, and rotative surfaces; their inter-

section with straight lines and planes, and their mutual intersections, as also their points of contact with planes; application of this to the determination of shadows.

Elements of the method of perspective projection.

Free-hand drawing, to draw a head or an entire figure in correct outline from a model, and to draw an ornament with shading.

Organic Statute of the Imperial and Royal Technical Intitute in Brunn (Moravia).

§ 1.

The object of the technical institution in Brünn is to afford systematically organized scientific instruction, and, in as far as is possible in a school, also practical instruction in machine building and technical chemistry, and at the same time to offer opportunities of study to those who wish to devote themselves to other industrial pursuits, and more especially to such as desire to become foremen or workmasters in the building trades, or who intend to follow a mercantile career, or who wish to prepare themselves for admission into a mining or engineering academy, or a higher school of architecture.

The institution is consequently specially adapted to the industrial and economical requirements of the province of Moravia, and its capital Brünn, and should in future new requirements arise, these shall in like manner be taken into consideration.

§ 2.

Settles the duration of the courses, which, as a rule, are each to embrace a period of one year.

§ 3.

Determines the division of the school into

A. Professional schools:—
   1. The machine-building school, with five courses, of one year's duration each.
   2. The school of technical chemistry, with four courses, of one year's duration each.

B. Special courses:—
   1. For foremen and master builders, extending over three years.
   2. Preparatory for those intending to devote themselves to mining, engineering, and to metallurgy, extending over three years.
   3. For mercantile science, extending over two years.

§ 4.

In the machine-building school shall be taught, in addition to the auxiliary sciences, the theory and the construction of the machines and apparatus used in industry and agriculture, and machine constructors, directors of machine building works, and of such manufactures as require a special knowledge of machinery, may here receive their scientific education.

§ 5.

In the school of technical chemistry the auxiliary sciences and the theory of such branches of industry, for the pursuit of which a knowledge of natural science, and more particularly of chemistry, is necessary, shall be taught in connection with chemical analytical exercises, and therefore manufacturing chemists, and all those whose future calling is based upon a knowledge of natural science, will here receive their scientific training.

§ 6.

The courses for foremen and master builders is intended to educate men for the building trade within the limits of the trade law, *i.e.*, to enable them to make substantial plans of buildings for industrial or economical purposes, or of common dwelling houses, and to execute these plans either on their own hands, or under the direction of others.

In the preparatory class for mining engineers and metallurgists, the knowledge and skill is acquired which are required for admission into the mining academies, &c.

In the mercantile class the general and special knowledge most useful to a person devoting himself to commerce or industry, shall be taught.

The subjects of instruction are:—

1. Mathematics, in two yearly courses.
2. *a.* Experimental physics.
   b. Technical physics.
   Each in a one year's course.
3. *a.* Descriptive geometry and corresponding exercises in construction.
   b. Encyclopædia of mechanical engineering and machine designing.
   Each in a one year's course.
4. Statics and mechanics.
   In two yearly courses.
5. *a.* Practical geometry and plan drawing.
   In a one year's course.
   b. Meadow culture and draining.
   During one half year.
6. *a.* Zoology and botany.
   b. Mineralogy and geognosy.
   c. Knowledge of merchandise (with the necessary consideration of commercial geographical circumstances).
   Each in a one year's course.
7. Mechanical technology. In two yearly courses.
8. *a.* Pure and technical chemistry.
   In a one year's course.
   b. Agricultural chemistry. During six months.
   c. Practice in the chemical laboratory.
9. *a.* Chemical technology.
   In two yearly courses.
   b. Practice in the laboratory.
10. *a.* Architectural drawing.
    b. Encyclopædia of architecture (*hochbauwesen*).
    c. Elevations, plans, and estimates.
    Each in a one year's course.

11. Machine building (inclusive of mill building) and plan drawing. In two yearly courses.
12. *a.* Theory of agriculture.
    b. Theory of the management of estates.
    c. Encyclopædia of forest culture and management.
    Each in a one year's course.
13. *a.* Theory of commerce.
    b. Laws concerning industry, factories, patents, commerce, and bills of exchange.
    c. Customs' laws and state monopolies.
    Each in a one year's course.
    d. National economy. During six months.
14. *a.* Commercial arithmetic.
    b. Business themes and commercial correspondence.
    c. Bookkeeping.
    Each in a one year's course.

§ 8.

Relates to the plans of study to be drawn up, and which may be changed to suit future circumstances, if approved by the Minister.

§ 9.

Regulates the number of masters, their duties, mutual relations, &c.

§§ 10 and 11.

Determine the times at which pupils shall be admitted, and the different conditions according to which they are to be considered as ordinary or extraordinary pupils, or as visiting students. These latter must previously have gone through the special classes of some technical institution, or have passed their examination in some faculty at a university.

§§ 12, 13, 14, and 15.

Relate to the election of a director and of boards of management, and to the rights, duties, and mutual relations of these officials, who are all chosen from among the staff of professors in the institution.

§ 16.

The conditions of admission to the first yearly course of the two professional schools, and also to the two special courses, are—

(*a.*) Attendance during the legally prescribed term in an upper gymnasium or upper "real" school, and the possession of a certificate of having passed satisfactorily the examination in mathematical and natural sciences in the highest classes of those institutions.

(*b.*) The satisfactory passing of a preliminary examination, in case the previous education has not been received in either of the above-named schools, and when the candidate is above 17 years of age.

(*c.*) The conditions of admission to the first course of the commercial class are that the candidate shall be above 16 years of age, and be provided with a certificate proving previous attendance in the highest class of a lower gymnasium or "real" school.

§ 17.

For admission to the higher courses of the institution it is necessary to prove possession of the knowledge taught in the preceding courses.

§§ 18 to 22.

Stipulate the conditions of admission for extraordinary scholars, and specify in detail the subjects of the examinations to which they must submit.

§ 23.

Relates to the steps to be taken by scholars seeking admission.

§§ 24, 25, and 26.

Regulate the removal into higher classes.

§ 27.

Determines the character of the yearly certificates to be given, and the principles in accordance with which they shall be drawn up.

§ 28.

Contains disciplinary rules.

§§ 29 to 32.

Determine that conferences shall be held between the director and the masters, and suggests the subjects to be treated of and the form of the proceedings.

§§ 33 and 34.

Refer to the appointment of professors and assistant teachers.

§ 35.—*Examinations for obtaining Diplomas.*

In each of the professional schools strict examinations shall be held to determine the entire amount of practical and theoretical knowledge that has been acquired by the student, and to which those pupils may submit who have attended the last courses of the schools up to the time of the examination as ordinary pupils, and who wish to obtain a diploma showing their competency for the calling they have selected.

Whether the previous studies have been carried on as ordinary or extraordinary pupils of the establishment matters not as regards these examinations.

No candidate for examination can however be admitted, unless he can prove that he has followed with at least moderately satisfactory success the study of national economy, and of the laws relating to industry and commerce.

Diplomas are given to 1, mechanicians, and 2, to technical chemists.

A special examining committee is formed for each of the professional schools, consisting of the professors of the respective branches of knowledge comprised in the examination, and of practical men belonging to the professions who are associated with the professors, and are nominated for the purpose by the Ministry.

§ 36.

The examination of mechanicians is divided into two parts, one practical, the other theoretical, and partly verbal, partly written.

The first part consists in the working out in detail of some great project combining architectural and machine construction, together with estimates of cost, and a written statement of the reasons on which these are founded. The subjects comprised in the second part are mathematics, descriptive and practical geometry, technical physics, chemistry, statics, and mechanics, and the theory and construction of machines used in industry.

The work is done under the superintendence of the board of management, and of the professors concerned, and the examinations are not allowed to interfere with the regular work of the schools.

§ 37.

The examination of technical chemists is likewise divided into two parts, one practical, the other theoretical. The first consists in the elaboration of at least two chemical preparations, and the solution of some great practical problem. The questions to be answered in writing in the theoretical part of the examination, relate to zoology and botany, mineralogy and geognosy, experimental and technical physics, the encyclopædia of architecture and machine building, pure and technical chemistry, agricultural chemistry, chemical technology, and the knowledge of merchandize, all within limits determined by the amount of instruction given in the school.

§§ 38, 39, and 40.

Contain further regulations connected with the examinations, and with the issue of diplomas, and the fees (50 florins) to be paid for these, or rather for the examination, as an unsuccessful full candidate, if he wish to repeat his endeavour a second year, has to pay the fee again.

§ 41.

Certificates of dismission are given to such students of the professional schools, as well as the special classes who do not wish to submit to the examinations referred to above, and are based upon the annual notes given during the course of instruction.

The remaining paragraphs relate to the administration of the institution, the library and the scientific apparatus belonging to it, the domestic staff, &c.; and a plan of studies for the various sections is added.

EXTRACT OF A REPORT ON THE STATE OF SECONDARY INSTRUCTION IN FRANCE IN THE YEAR 1865, JUST PRESENTED TO THE EMPEROR BY THE MINISTER OF PUBLIC INSTRUCTION.

THE facts stated in the long report which has just been submitted to your Majesty demonstrate that the interests of secondary instruction have not ceased to be objects of the greatest solicitude to the Imperial Government, and that in this, as in the other branches of instruction,

considerable progress has been made. I will now recapitulate the principal points.

Number of Lycées.—The number of lycées, which in 1809 amounted to no more than 35, in 1830 to 38, in 1848 to 53, at the present moment amounts to 81. Thus 28 lycées have been created in the interval between 1848 and 1867.

The only departments which are, as yet, without such institutions are the departments of the Basses Alpes, the Hautes Alpes, the Ardennes, the Ariège, the Cantal, the Corrèze, the Creuze, the Drôme, the Eeure at Loire, the Lozère, the Oise, the Pyrénées Orientales, the Haute Savoie, the Seine et Marne, and the Vosges. But in these departments all the wants of secondary instruction are satisfied by well organized communal colleges, or by imperial lycées.

Material Arrangements.—We have but 16 lycées, which were constructed with a view to their present purpose; the others, located in former convents, could only be incompletely adapted to the new wants. A great effort has been made within the last years. The lycées have devoted to the purpose a great part of the reserve funds they had accumulated during a period when articles of consumption were less high in price; the towns and the departments have seconded their efforts. The lycées Saint Louis and Bonaparte in Paris, those of Agen, of Amiens, of Angoulême, of Bourges, of Contames, of Douai, of Limoges, of Marseilles, of Montpellier, of Moulins, of Orleans, of Poitiers, of Rennes, of Rouen, of Reims, of Tournon, have been considerably improved, and have almost been transformed into new establishments. In nearly all the others also notable improvements have been made. Care has been taken to introduce light and air, to give to the rooms inhabited by the pupils the dimensions required for health, to procure large, open, and well-situated spaces for recreation grounds, &c. The school furniture, as well as the ordinary furniture, has, in the most cases, been renewed. Local sanitary commissions, instituted in connexion with each academy, and the central commission established in Paris under the eyes of the Minister, watch with attentive solicitude over everything that concerns the health and the well-being of our school children. The inspecting medical officers belonging to the military service have been kind enough to lend us their assistance, and to visit, on their tours of inspection, our educational establishments, to ascertain their sanitary condition.

Small Colleges (Petits Collèges).—I have pleasure also in calling attention here to a most excellent innovation with respect to the physical development of very young children, who, in large cities, are exposed to a number of depressing influences, against which their constitution is unable to re-act. There have been created for them special establishments, situated in the country, under the most favourable conditions for health, and in which they enjoy a diet suited to their age. The lessons in these establishments are short, and the recreations numerous. The lycées of Bordeaux, Lyons, Marseilles, Montpellier, and Nice, already possess these useful annexes. The branch of the lycée Louis le Grand, situated at Vauves, has been converted into a separate lycée, under the patronage of the Prince Imperial. It unites within its handsome new buildings 800 pupil boarders, and the administration has been obliged to impose on itself the rule of not going beyond this limit, although numerous families are seeking for their children admission.

In many of the lycées, owing to the extent of ground possessed by them, it has been possible to erect on the spot small colleges completely

isolated, and some of which are of considerable extent; in others, separate quarters have been assigned to the youngest children. It will thus be seen that the physical care, which is so essential in infancy, occupies, in the highest degree, the constant attention of the administration; and as respects this matter, very satisfactory results have been attained.

The sanitary condition, in as far as it can be tested by the number of deaths, is indeed excellent. According to the official returns, the average number of deaths among boys from 10 to 18 years of age in the French population is 0·45 per 100; but the lycées lost, in 1865, only 1 pupil in 505.*

The confidence of families increases in consequence, and with it the number of pupil boarders. In 1842 the average number of these in the Royal Colleges was 112; the average in the lycées is now 160, and the number of half-boarders is three times as great, that is to say, 43, instead of 14, to each lycée.

Classical Instruction.—Our plan of studies also required a thorough reform. Your Majesty's intention was to endow France with a system of education which should answer to the requirements of modern society, without breaking with the traditions of the past. Many attempts have been made during the last 80 years to solve this difficult question. I, in my turn, have been enabled to lay before your Majesty for approval measures which, up to the present moment, have led to happy results, because they were, so it seems to me at least, based upon a clear and simple view of things.

There are two matters which are of the greatest moment to France. She feels the necessity of giving to all her children the elementary knowledge which is indispensable for every man and citizen. To do this is the duty of the primary school; and she desires to give to those who wish to extend their knowledge further, such instruction as is best suited for their future condition.

To him whose natural faculties designate him as adapted for the liberal professions, or who wishes to enter upon active life fortified by brilliant and severe studies, she offers a classical education.

To those who would pursue an industrial, a commercial, or an agricultural career, she offers special instruction (technical instruction).

These two systems of instruction, united at their base, and but imperfectly separated at the summit, were like those bodies with two heads whose life is always very languid. They have, therefore, been entirely separated, in order that each might grow stronger by the free development of individual life.

This suppression of the system, known by the name of *bifurcation*, has been carried out to the entire satisfaction of all the branches (*familles*) of the university. Philosophy has resumed its name and its place at the head of classic instruction. A new study, that of cotemporary history, has been introduced; the subject matters of the various courses have been revised, so as better to define their object, and to render the gradual progress of the pupil more certain; the lessons in foreign languages have adopted the practical character which they ought always to possess. The degree of Bachelor, by being divested of useless exactions, has become at one and the same time more easy of attainment for good pupils, and more difficult for those who, taking no

* The average of the five years, from 1862 to 1866, one of which was a cholera year, was 1 death in 499 pupils.

trouble to prepare themselves sufficiently, rely for success entirely on efforts of memory.

This return to the ancient traditions of classical education, was at once signalised by a considerable increase of pupils, and by a rise in the level of the studies. In two years the lycées have gained 3,482 pupils; the two great classes of rhetoric and of philosophy, which the *bifurcation* system had emptied, number 733 pupils more to-day than in 1864, and among these are counted 193 veterans. These numbers are full of promise for the future.

As regards the studies themselves, the deans of the faculties of letters are unanimous in acknowledging that we have returned to the level of the most prosperous periods, and that in some respects the pupils of the present time have even the advantage over the others. The deans of the faculties of science on their side state that an improvement has taken place in the scientific examinations. These testimonies are confirmed by facts, I mean by the results of the two general competitive examinations (*concours général*) for Paris and for the departments, and by the number of admissions to the *grandes écoles*.

Special Instruction.—The special instruction being thus separated from the classical instruction, it became possible to give to the former a regular organization.

For a long time complaints have been raised against the too exclusively literary and theoretical direction given to our system of instruction. Richelieu and Louis XIV. had recognised the necessity of a system more varied, more practical, and more in accordance with the needs of the times. After the inquiry made during the reign of Louis XV., into the state of public education, these reforms were loudly demanded. The Convention laid down the principles of a new system; the First Consul wished to see them carried out, and in 1842 Prince Louis Napoleon expressed a similar wish. Timid and partial attempts only were made. At present, however, this system of instruction at last assumes a regular place in the general plan of our studies. Created by the law of 21st June, 1865, which was so fortunate as to be unanimously approved in the Legislative Corps and in the Senate, it has been everywhere organized without causing any detriment to the classical studies, and the number of the pupils surpasses all expectations.

The normal school of Cluny, established in the vast buildings of the Benedictines, secures a sufficient supply of teachers for this new branch of instruction. It presents to view this singular feature, that its technological collections have been furnished by the industrial classes, who have wished to contribute by voluntary gifts to an undertaking of which they comprehend the full importance. The Council General of the Seine has recently evinced a generous concurrence in this idea, by the vote of a subsidy of 10,000 francs.

Number of Pupils.—The confidence of parents has responded to the efforts of the administration to improve the studies and the material condition of the lycées; on the 31st December, 1865, the number of pupils was 32,630, and on the 1st of November, 1867, it amounted to 36,112; in 1850 the number was 21,049, so that the interval of 17 years, from 1850 to 1867, gives an increase of 72 per cent. in the public schools.

The number of pupils in communal colleges (*colléges communaux*) and private establishments has also increased. The number in the *colléges communaux* in 1842 was 26,584, and in 1865, 33,038, although at this last named date there were 61 *colléges communaux* less than at

present, and in spite of the transformation of the most important of these establishments into lycées.

In the private establishments the number of pupils was 31,816 in 1842, and 77,906 in 1865. This increase mainly took place after the law of 1850, and has been particularly manifested in the clerical schools.

These general results are a sufficient answer to those who maintain that the state of public education in France at the present moment is inferior to what it was previous to the Revolution. Even leaving out of the question primary instruction, which has been, so to say, entirely created in our day, we are justified in maintaining, in accordance with all that has been shown above, that, as regards secondary instruction, a comparison between the time anterior to the Revolution and the 19th century, allows no doubt to be entertained as to the superiority of the progress made under the impulsion of your Majesty. In 1865, indeed, we had 140,253 pupils in the establishments for secondary instruction, *i.e.*, the double of the number given for 1789.

Distribution of the Pupils in respect of public instruction and private instruction, and in respect of Secular and of Ecclesiastical Schools.—The 140,253 pupils just mentioned were in 1865 distributed as follows:—29,852 were in the lycées, and 32,495 in the *colléges communaux*, that is to say, 62,347 came under the head of public instruction;* 43,009 were in the private establishments, and 34,897 in private ecclesiastical schools, or in all, 77,906 pupils under private tuition.

From another point of view, three-fourths, or 105,356 of the pupils of the secondary schools are in lay institutions; and about one-fourth, or 34,897 in ecclesiastical establishments.

If to the 34,897 pupils in the ecclesiastical establishments be added the 23,000 pupils of the small seminaries, many of whom do not enter holy orders, this will give 57,879 pupils for the ecclesiastical schools, or a proportion of more than one-third.

Effects of the Law of 15th March, 1850, on Private Schools (l'enseignement libre).—It is interesting to mark the effects produced by the law of 15th March, 1850, on secondary instruction outside the lycées and colleges.

On the 1st of October, 1850, the date on which the law of 15th March of that year came into effect, the number of private schools amounted to 915 (of which the greater proportion were secular or lay schools), including 52,906 pupils.

On the 1st of March, 1854, less than four years later, the number of private establishments had risen to 1,081, of which 825, with 42,462 pupils, were secular establishments, and 256, with 21,125 pupils, clerical: together, 63,657 pupils.

On the 31st December, 1865, there were no more than 935 private establishments altogether, of which 675 (with 43,009 pupils) were secular, and 278 (with 34,897 pupils) were clerical, making together a total of 77,906 pupils.

In December, 1867, the number of private schools had further declined to 909, but with an increase of 507 pupils; 78,413 instead of 77,906.

* In the numbers, 29,852 in the lycées and 32,495 in the *colléges communaux*, are not included the pupils of the various institutions and boarding schools who attend the classes of the public schools. The number of day scholars attending the classes in the lycées was 2,778, and in the *colléges communaux* 543, giving a total of 65,668 pupils following the course of studies in lycées and *colléges*.

In fine, from 1854 to 1865 (the documents for 1850—1853 are wanting) the private secular establishments and the dioccsan schools placed under the direct authority of the bishops, have remained stationary. The first named have, during these eleven years, only gained 547 pupils (43,009 in 1865, instead of 42,462 in 1854); the last named have gained only 1,056 pupils (9,107 instead of 8,051). But the number of secular or lay establishments have decreased by 168.

	In 1854.		In 1865.		In 1867.	
	Number of Establishments.	Number of Pupils.	Number of Establishments.	Number of Pupils.	Number of Establishments.	Number of Pupils.
Jesuits	11	2,818	14	5,074	14	5,331
Maristes	13	1,449	15	2,255	15	2,205
Lazaristes	1	159	2	331	2	341
Basilians, Picpuciens, Doctrinaires, Priests of the Perpetual Adoration, Priests of the Sacred Heart of Jesus and of Mary, Brothers of Saint Joseph ..	8	859	12	1,815	21	2,950
Total	33	5,285	43	9,475	52	10,827

In the same space of time, the teaching congregations have founded ten new houses (44 instead of 33), and have increased their school population by 79 per cent. (9,475 instead of 5,285).

The schools directed by secular clergymen have increased from 156 to 165, with 7,859 pupils in 1854, and more than the double, or 16,315 in 1865.

To sum up, within the space of eleven years lay instructors have lost 168 private establishments, but they have gained 547 additional pupils, while ecclesiastics have founded twenty-two new establishments, and have gained 13,702 pupils.

But the balance between these two orders of schools is re-established by public instruction (lycées and colleges), which has, in the same space of time, acquired thirteen additional establishments, and 19,228 pupils.

It results from these numbers, that since 1854 the only schools that have progressed are schools of the State and the schools of the clergy—two kinds of establishments which, for different reasons, merit respect and confidence, but with regard to neither of which it can be said that they enjoy liberty of instruction in all its plenitude, because in the case of the first named institutions, it is the school authorities, and in the case of the second, it is the ecclesiastical authorities who regulate, directly or indirectly, the programmes and methods followed. There is, on the contrary, a falling off in the private establishments, which are the representatives of true scholastic liberty, because they are regulated according to the wishes of the persons who have founded them, or who direct them.

Thus as regards scholastic enterprise, private action is tending to disappear in face of that of the two great collective forces of the State and the church. But as it is the plan of the general policy of the Emperor to encourage on all sides the private activity of the citizens, the public administration makes a rule of favouring all enterprise of private individuals in this matter of education, the first of all industries. The administration supports private institutions by the encouragement it gives to them; it assists the formation of independent societies for the institution of professional or secondary schools, for boys or girls; it authorises the opening of private classes, and of conferences connected with the various faculties, in order that by the establishing of liberty everywhere, there may be everywhere that emulation and competition which are the mainsprings of progress.

Admissions into the Schools.—It is not possible to estimate the value of the instruction given in the two kinds of establishments (that is to say, in the clerical and the secular schools) by the comparative numbers of their pupils admitted to the examination for the Bachelor's degree. The administration is not apprised of whence come the candidates who present themselves to the different faculties; but the same is not the case with respect to the youths who have entered their names for admission into the superior special schools.

From an examination of the admissions to the superior schools (*les grandes écoles*) it appears:—

1st. That the eight lycées and colleges in Paris and Versailles, comprising the establishment of St. Barbe, have obtained:—

29 admissions out of 43 to the Ecole Normale;
81 admissions out of 145 to the Ecole Polytechnique;
70 admissions out of 301 to the School of Saint Cyr;
11 admissions out of 76 to the Naval School;
15 admissions out of 38 to the Ecole Forestière;
119 admissions out of 233 to the Ecole Centrale.

325

2nd. That the lycées and colleges in the departments, and the other State establishments, have obtained:—

14 admissions to the Ecole Normale;
48 admissions to the Ecole Polytechnique;
147 admissions to the School of Saint Cyr;
47 admissions to the Naval School;
10 admissions to the Ecole Forestière;
49 admissions to the Ecole Centrale.

315

3rd. That the private lay schools which do not attend the classes of the lycées, and pupils educated at home, have obtained:—

1 admission to the Polytechnic School;
15 admissions to the School of Saint Cyr;
6 admissions to the Ecole Forestière;
43 admissions to the Ecole Centrale.

69

4th. That the clerical schools have obtained:—

15 admissions to the Polytechnique School;
69 admissions to the School of Saint Cyr:
14 admissions to the Naval School;
7 admissions to the Ecole Forestière;
22 admissions to the Ecole Centrale, there being comprised in this number 2 pupils of the Frères de la Doctrine Chrétiennes.

127

This gives a total of—

640 admissions for the State establishments, out of a total of 836;
69 for the private secular schools and home students;
127 for the clerical schools.

836

The results shown are thus—that secular instruction, embracing 75 per cent. of the population of the schools, has obtained 85 per cent. of the admissions, and that the clerical establishments which comprise 25 per cent. of the total number of pupils, have obtained 15 per cent. of the admissions.

Expenses of Secondary Instruction.—The average charge for a pupil boarder in the lycées is 739 francs, or 34 francs more than in 1842—a very slight augmentation, and out of all proportion to the rise in price of all articles.

In the colleges, the charge is 649 francs, that is an increase of 265 francs on the charge of 384 francs, which was the price in 1842.

It may be said, therefore, that the lycées have not augmented their price, while the colleges have considerably increased theirs.

Altogether the expenses of secondary instruction amount to 64,464,572 francs 81 cents, of which less than 3 millions are contributed by the State, about 59 millions by the families of the pupils, about 2 millions by the communes, and only 171,000 francs by the departments.

Nevertheless the lycée may, with perfect right, be considered as an establishment of great use to the entire department; for there are but very few of them in which more than half of the boarders are not strangers to the town in which the lycée is established. If it did not exist, the families in the department would have to seek at a greater distance, and at a greater cost of money and of painful separation, the *education* which they desire for their children. It would, therefore, be no more than just, that the departments should bear a less insignificant share of expenses by which three parties are benefited, but the burden of which falls at present upon two only, the commune and the State.

Financial Administration of the Lycées.—The economic administration of the lycées causes an outlay of very nearly 20 million francs, or on an average 250,000 francs for each lycée. These affairs are in the hands of stewards (*des économes*), under the superintendence of the head masters (*proviseurs*), and the control of the inspectors of academies, of the rectors, and of the inspectors-general. All the accounts are besides audited by the *Cour des Comptes*.

In 1842 the subsidy of the State to the lycées was on an average

29,019 francs; in 1865 it did not amount to more than 22,331 francs, thus showing a diminution of one quarter.

This subsidy from the State is indispensable, because on an average each pupil necessitates an expenditure of 829 francs, while he contributes only 739 francs to the revenue, whence arises a deficit of 90 francs for each pupil, which represents a total annual shortcoming of nearly 1,600,000 francs.

In 1850 the five lycées in Paris cost the State 281,000 francs; at present they ask for no subsidy.

After this sketch of the progress which has been accomplished, it remains to indicate summarily the improvements which have still to be carried out.

Material Improvements.—In the foremost rank must be placed the completion of the building works connected with the lycées. Families are more exacting now on these points than they used to be formerly, and it is the duty of the administration to furnish the young people with dwellings in which they may find everything that will strengthen the body as well as all that will develop the intellect.

The restoration of our lycées is as yet very incomplete; great works have still to be carried out, but it would be superfluous to enumerate them. I will restrict myself to mentioning that the first lycée of the empire, that of Louis-le-Grand, is still in a state of dilapidation and decay, which it pains the eye to behold, and which impedes the conduct of affairs; that the lycées of Angers, of Bordeaux, of Brest, of Dijon, of Lyons, of Metz, of Nancy, of Nice, of Nîmes, of Rouen, of Strasburg, and of Toulouse, are neither in keeping with the importance of the towns in which they are situated, no do they answer to the requirements of public education, and that in a great number of other cases also considerable improvements are called for.

The constant ventilation of the rooms habitually occupied by the pupils, such as the class-rooms and the dormitories, is of extreme importance. All the questions connected with this difficult problem are being studied; essays have already been made in a great number of lycées, and everything leads to the hope that the renewal of the air, through the night as well as the day, will soon be ensured by simple and efficacious means.

The domestic regimen, more especially all that regards food and dress, has been considerably improved of late years, and I am occupying myself with the further ameliorations which may still be introduced.

Gymnastics, which are so useful in developing the physical powers, are included in our system of public education, but not in a quite satisfactory manner; they must be developed: Article 9 of the new army law will assist me in doing so. In order that these exercises may not be interrupted during the winter season covered gymnasiums are absolutely necessary, and they are wanting in almost all cases. It is my intention to provide for this want as soon as the means at my disposal will admit of it.

For the execution of all these works it will be necessary that the Ministry of Public Instruction should be provided with special funds, for large engagements, which I cannot estimate at less than four millions, have been entered into with the various towns, and in order to meet this extraordinary expenditure it will be necessary to open a credit bearing the same character. The ordinary subsidy to the lycées would then no longer be partially diverted from its normal use, which is the improvement of the studies, of the condition of the professors, and of the scientific collections

Necessity for lengthening and multiplying the times of Recreation.—One point seems to me to demand speedy reform. The old university was no friend to recreation; the new one has altered nothing in respect of this matter. It seems that there is reason to modify in some measure the order of the exercises, and to make some changes in the distribution of the day of our pupils. I should like to see shorter time for study, and more time given to recreation exercises of a kind calculated to develop strength and agility. The work of the pupils would not suffer by the innovation, and their health would be the better for it. In the plan of studies for the schools of special instruction the duration of of the classes has been curtailed, and experience has already proved that the studies have not suffered in consequence. There are great differences among our lycées in this respect, owing to old traditions and local habits. In some there are only three periods of recreation in the day, comprising altogether one hour and a half, which makes the working day far too long. Indeed, the duration of the studies and of the classes varies from 11 hours and 45 minutes in the lycées of St. Louis, Agen, Lyons, Mâcon, St. Etienne, Tours, &c., to 10 hours 20 minutes in that of Chaumont, 10 hours and 15 minutes in that of Orleans, &c. In all cases it exceeds the working day of the operatives in the manufactories of Paris, and there must be further added to it the evening studies (which are not indeed obligatory) of the pupils in the upper division. The children, they say, do not work during these long hours; if this be so then why condemn them to an immobility which is not natural at their age, and why not allow their bodies to take advantage of the time which is not turned to account for their minds.

Necessity for having shorter classes and times of Study.—There can be no doubt that this system acts detrimentally on the physical constitution of the young people. How, for instance, are we to explain that about one quarter of the pupils of the Polytechnic School, and of the Ecole Normale, are obliged to use glasses, and that their height is below the mean?* Excessive work, prolonged study, and the bad light and insufficient ventilation of the halls, are no doubt the cause of an evil which in Germany also, under the same circumstances, has assumed considerable proportions.

In order to give a place in our national education to living languages, to drawing, to music, and to gymnastics, which ought all to bear a greater share in it than has hitherto been assigned to them, though without mutilating the classical studies. In order to find in the school day the time that is necessary to set aside for play and for bodily exercise, it is essential that the duration of the classes and of the studies† should be shortened. This may be effected by giving shorter tasks, which, for being shorter, will be better executed, and not so lengthy lessons, which will be better learned, and which should, above all, be repeated in the *quartier*. Freed from the dictation lesson, from the curiosities of syntax and of prosody, which are useless, from the repetition of lessons, to which the professor would devote but a few minutes, except when he wished to correct the pronunciation and the manner of delivery, the class would become less long, to the great advantage of the children, whose attention, besides, cannot be kept up during two consecutive hours, since that of a grown up man is

* In the Polytechnic School 67 pupils, out of 280, are below 1 m. 658 mm., the general average height in 1863 and 1864, of all young men of twenty years of age.

† By classes is meant, the lessons given by professors; by studies, the lessons and tasks learnt or prepared by the scholars.

fatigued by a lecture (*leçon de faculté*) which extends beyond sixty minutes.

In the study there should be no more of those corrected copy books, which the pupil never consults, those interminable abstracts of history, whole pages of which they copy out of books, those geographical maps, in making which they take hours to trace the course of rivers, mountains, and localities, the names of which they will never know.*

In this way much time might be gained; but it will be quite sufficient to point out the object in view, and the sagacity of the masters will know how to devise means for its attainment. In the lycée of the Prince Imperial, and in the small colleges (*petits collèges*) of the great lycées, they have already succeeded in dividing the day in a manner more appropriate to the age of the youngest children; the same has still to be achieved for the middle pupils, and for the grown-up scholars. It is my intention to recommend to the study of all concerned a set of general rules which shall reconcile the exigencies of study with the exercise and recreation necessary for health.

If Germany has the advantage of us as regards her primary schools, which are, however, equalled in our eastern departments, as regards her *real schulen*, which we shall soon surpass, perhaps also as regards some of her universities, so well attended and so full of life, England, in her classical schools, does more than we do for education in certain directions. The children, more free than among us, there soon learn, at their own risk and peril, how to use their liberty. The great object held in view is not to overcharge the mind with a mass of acquirements, but, while strengthening it and rendering it pliant by means of study, to place the will over it as its strict and resolute master. For this reason, the school is in England, more than is the case with us, the apprenticeship of life.

We cannot suddenly change our scholastic habits, which are besides in accordance with our social organization, but it would not be impossible to borrow something from the customs and manners of these schools on the other side of the Channel. It is a study we have to make, and which will be much facilitated by the excellent report on English schools, which has just been drawn up by Messrs. Demogeot and Montucie, after a mission to England and Scotland.

Classical Instruction.—"This scholastic organization has resisted many shocks, and, as a whole, will hold its own against all attacks, because it proceeds from a clear view of the nature of the spirit that pervades French society, and of the very conditions of that society."† No essential changes need, therefore, be introduced; but we may regret, in some respects, a uniformity which does not correspond sufficiently with the differences of mental constitution which occur. A pupil in the third class, for instance, is forced to write Latin verses, though his aptitude may oppose his doing so; consequently he writes execrable verses, and runs the risk of becoming disgusted with Latin poetry. Not all pupils attain a sufficient knowledge of Greek to enable them to appreciate the beauties of the literature, and considerable time

* It is not meant to say that the pupils should never be asked to do the task over again with the corrections of the master, made verbally, which would force the child to be attentive in the class, and thoughtful when at work in the study; and indeed a short theme in history which would be an exercise in the French language, and a map traced rapidly, and containing only as many details as the memory of the pupil can and ought to retain, seem very recommendable.

† Speech made at the distribution of prizes at the *Concours Général*, of 7th August, 1867.

is lost in studies, which are, no doubt, very fine, but which, in many cases, remain sterile. Far from wishing to suppress any of these branches, to which I attach great value, I wish, on the contrary, to fortify them, and I would, therefore, after repeated experience, cease to impose them upon minds which absolutely rebel against them, in order to allow these pupils to concentrate all their powers of work, and of attention, on one only of the great classic languages. Latin would, in consequence, be more thoroughly learnt; its literature, the striking echo and reflection of Greek literature, which is, as it were, embodied in it, would be better known; and Greek, becoming thus the object of special care, would be taught in a wider spirit, and learnt better.

In order to effect this reform, ought we to separate the courses according to the nature of the studies, and to divide the pupils, not as at present, according to the number of the class, but according to their standing in the principal branches of instruction? The difficulties of carrying out such a system in the great lycées, as well as the advantages that would attend its introduction, are at once obvious. It would not prevent the more gifted pupils from following all the courses of lectures, while it would at the same time favour the serious and useful labours of ordinary pupils, who, incapable of devoting themselves profitably to studies of too complex a nature, might, by concentrating their endeavours, derive greater benefit from the time spent in the classical lycée. Thus the living languages, drawing, and music, which would be *obligatory* in the grammar classes, in order that the aptitude of the children might be tested by them, would become matters of choice in the classical classes, and those who had not been able, or who had refused to accomplish any proficiency in these special branches in the first courses, would be resolutely refused admission into the second.

I limit myself at present to merely calling attention to these matters, without asking your Majesty as yet to prescribe any new rules with reference to them. But I believe that there is urgent need for the introduction into our plan of classic studies of some modifications so managed as not to alter its character, and calculated to diminish the load of work which weighs upon the head of every future bachelor of arts or letters. The examination for the degree might, in that case, comprise in addition to the obligatory subjects of the ordinary examination, such subjects among those left to choice as the candidate may select to be examined in. This custom prevails in England, and acts admirably.

It is indeed the system followed in France, also with respect to the diplomas in the schools for special instruction, as also for the superior brevets relating to primary instruction. Its introduction would not therefore be an innovation. Besides there is no alternative but to resign ourselves to it, if it be proved on attentive examination, that the burdens imposed upon our youths are, time after time, becoming heavier in consequence of the increase in the number of subjects of instruction; sciences, modern languages, history, geography, drawing, music, and gymnastics assume, by the force of circumstances a place constantly increasing in importance. It is not possible to go on for ever adding, without ever retrenching; otherwise the instruction will become superficial, because of the short amount of time allotted to each branch. This delicate and important question already occupied the public mind under the Restoration, when a change in the direction of our system of studies was contemplated. I will take it up again in order to subject it to a searching investigation. Public discussion,

called forth on the subject, will no doubt be of assistance in finding a satisfactory solution.

Extension of Special Instruction.—This system of instruction does not as yet exist, at least in its most complete form, except in some few localities. Intended in the first place to impart general culture more rapidly than can be done by a classical education, and in the second instance to inculcate the special knowledge required for the various branches of commerce and industry, it consists of a fixed and definite part, and of a part which accommodates itself to the necessities of the different localities. This system must be extended and spread.

To the schools founded last year at Cluny, at Mont-de-Marsan, and at Mulhouse, there will be added this year the Agricultural Lycée of Napoleonville, and the Collège Metallurgique at Calais. But it is much to be desired that independently of the special courses of lessons in the lycées and the collèges, each geographical region of the empire, which is characterised by the distinctive features of its soil and its industry, should possess one of these great schools with a system of special instruction suited to its needs.

University Salaries.—The modest position of the members of the university has already been sensibly ameliorated, thanks to the solicitude of your Majesty. The titular and divisional professors, the *chargés de cours*, the teacher of modern languages, and the elementary teachers have had their salaries increased. Yet, I am obliged to confess, that the remuneration of the professional body is neither in accordance with the difficulties of the task imposed upon them, nor with the conditions of material life.

Foundations for the benefit of the Assistant Teachers (maitres répétiteurs) of the Secondary Normal Schools.—There is one class of functionaries in the lycées who merit particular attention; I mean the assistant teachers (*maitres répétiteurs*).

That which is urgent in their case, is not so much that their salaries should be augmented, as that more time for their own studies should be secured to them, and with this greater facilities for obtaining university degrees. Their position ought to be one of transition—a stage from which they should rise to a higher level. The establishment of secondary normal schools which has been tried with success at Douai, is about to be extended to all the academies. The *maitres répétiteurs* will find in these schools the means of rising rapidly into the ranks of the professors, and will see in the establishment of these institutions a proof of the paternal solicitude of the university.

Communal Colleges: the necessity of reducing the number of Teachers, in order to augment their Salaries.—It is in the communal colleges that the greatest amount of hardship is suffered; numbers of the teachers find the remuneration given for their modest, but useful services, hardly sufficient for their daily bread. It is necessary that these establishments, which form an integral part of our system of public instruction, but which, since the period of the revival of learning in France, have always received insufficient support from the State, should not only be kept up, but also that they should be strengthened; at all events more favourable means of existence must be provided for the greater number of them.

At the time of the discussion to which the law of 11 Floreal, in the year 10, gave rise, the communal colleges, then called secondary schools, were described as representing the instruction provided for the small towns, and for those youths who did not require to go through the entire course of studies in the lycées and the special

schools. It was intended that they should be able to acquire in those secondary schools knowledge useful in a variety of trades or professions. The instruction given in the colleges, regulated according to local necessities, admitted of a great variety of studies under a very small number of professors.

Such was indeed the real character of the communal colleges; but this was misunderstood at a later period, when attempts were made to organize them after the model of the lycées. The number of professorships was multiplied, in order that in these small colleges also, the course of instruction might be regular and complete; but to enjoy this satisfaction, it became necessary to reduce to an insufficiency the salary of each professor.

By the order of 26th January, 1839, an endeavour was made to remedy this evil. The communal colleges were divided into two classes. In the first, the salaries of the *régents* were to be from 1,400 to 1,800 francs; in the second from 1,200 to 1,500 francs. But this amounted to no more than a wish expressed, the realisation depended upon the good will of the communes, and in a great many cases the insufficiency of the municipal revenues prevented the order from being carried out. Besides the sums fixed, which were very moderate even in 1839, would to-day be quite insufficient, and yet in a great many colleges the salaries do not even come up to this.

Nevertheless the towns thoroughly appreciate their colleges, and impose great sacrifices upon themselves for the support of the schools. To insufficiency of means, therefore, must alone be attributed the smallness of the salaries of the teachers, and the frequently very dilapidated condition of the school houses, and the school furniture.

This state of things calls for the serious attention of the administration. The communal colleges merit its interest, on account of the services which they render to education. Placed within the means of the families, they introduce a taste for instruction in the smallest localities, and do not take the children away from their homes. In coming to the assistance of the towns, the State will induce new efforts on their part.

For a long time the State had, with the exception of a few local concessions, done nothing for the communal colleges, when in 1846 a fund of 100,000 francs for their encouragement was inserted in the budget. This fund, increased by further successive grants to 223,000 francs, has for the year 1868 been raised to 300,000 francs. Even this allocation cannot be considered as definitive, but at all events it enables us to set seriously to work.

According to usage, the contributions of the State are in a great measure applied to the support of the professorships, the salaries of which are paid by the State directly to the titularies. This method is, however, in so far inconvenient that the subsidies thereby become fixed (*immobilisées*), as they can neither be diminished nor suppressed, without the salary of the professor being at once endangered. The salaries of the school functionaries should, on the contrary, be a matter of communal expenditure, and the subsidies of the State should bear the character of extraordinary grants, or encouragements; this is the method which I desire to adopt.

The average amount of the salaries in the communal colleges in the present day is, for grammar only, 1,391 francs; for the classics, 1,643 francs; and for the sciences, 1,656 francs.

In some colleges the salaries fall to 1,000 francs and 800 francs, and even below this.

It will easily be understood that this must be so if the unnecessary number of teachers be considered which the towns allow themselves to indulge in. We possess 139 colleges, each with 50 classical scholars. and numbering altogether 3,582 pupils. For these there are no less than 582 professors, that is one master for every six pupils.*

This numerous staff of teachers acts crushingly on the municipal finances, and in its turn the municipal budget takes its revenge by only allowing miserable salaries to the masters. All parties are losers by this, the town as well as the teachers; and the studies are not benefited, firstly, because with such appointments the most experienced masters cannot be secured; and, secondly, because classes, consisting of 2, 4, or 6 pupils, are not real classes; the pupils are not stirred to emulation, and it is very difficult for the professors to keep up their zeal for any length of time.

The studies in our lycées and colleges are, indeed, placed between two evils; classes which are too numerous, and in which, in consequence, the pupil escapes the control of the master, and classes which are not sufficiently numerous, and where all emulation disappears—evils against which the legislation of former days had made provision. The regulations of 19th Frimaire, of the year 11, carrying out the enactments of the 11th Floreal, of the year 10, determined that there should be 1 master to every 25 scholars, without recognising the right of the professor to teach only one subject.

Serious modifications ought, therefore, to be introduced in the interest of the towns, the studies, and the professors.

Let the number of teachers be diminished, and their salaries augmented, the municipal budget will be as much benefited by it as the professors. The reform may be conducted so as not to imperil the interests of any of the functionaries whose places are suppressed.

In colleges where there are 6 pupils in the rhetoric class, the instruction goes on for two hours, just the same as in the college of Louis-le-Grand, where there are 80 pupils in the class. The lessons in the small classes should be shortened, and the pupils should begin other occupations, while the professor is set free to commence some other lesson.

That which has been said above with reference to the lycées, is still more applicable to the colleges. The principle at present followed is classification according to the number of the class-room; let us group the pupils according to their powers, and the studies will be improved, for the tail of the class (as it is called in the parlance of the lycées) will then no longer keep back the head, but, separated from the trunk, it will make a new head for itself. This is a psychological phenomenon, which repeats itself whenever it is tried.

The lycée of Mont-de-Marsan, which last year had 61 classical scholars belonging to all the usual classes, got on with only 3 professors of Latin, and its pupils were successful at the academical competitive examinations, as well as at the examination for the Bachelor's degree. In the school of Soréze, which has brilliantly distinguished itself, a similar plan was adopted. The system has, therefore, already been tried with favourable results.

If the desire—a very estimable one, no doubt—to have a school

* Taking all the colleges together, it will be found that the 15,943 classical pupils comprised in them have 1,828 professors, or one to every 9 pupils. The same is not the case as regards the system of special instruction, in which the classes being less divided there is one master to 28 pupils, nor as regards the primary schools, where, for the same reason, there is one master to 27 pupils.

after the pattern of the great lycées in Paris, prevents the municipalities from entering on the path proposed, the 300,000 francs contributed by the State, and the 2,256,422 francs expended by the cities, will not cause the disappearance of the painful evil, which has been called genteel poverty (*lamisère en habit noir*). There is urgent necessity for improving, in one way or another, this truly painful position of men invested with public functions, of great importance. It would be proper to fix at least: for the professorship of grammar a minimum of 1,600 francs, with the power of raising it to 2,200 francs; for the professorship of classics and sciences, a minimum of 1,800 francs, with the power of reaching 2,400 francs.

The teachers in the communal colleges are not divided into classes, so as to insure to each a progressive amelioration in his position earned by his services. In order to obtain a higher salary he must be transferred to another establishment, where there may be vacancies. Advancement in the same college is impossible, and the principle of emulation does not exist. It is much to be desired that a different organization should be established. But the budgets of the towns are already much burdened, and increased expenditure for the colleges could not be imposed upon them, unless the Minister makes it a condition that the State will contribute towards it. I request the Emperor's authorization to proceed in this direction.

The material condition of the colleges, which leaves much to be desired, ought also to be improved. The municipal administrations appreciate the importance of such improvements in the interest of the health of the children, and seem inclined to undertake them; but the means of these bodies are not always equal to their good will, and in such cases it would be right that the State should share the expense, on condition, however, that these extraordinary grants should always retain an exceptional character, and that they should be regulated according to the sacrifices which the towns themselves might be willing to make.

Exhibitions.—The funds allotted to gratuities for the secondary schools are at present less in amount than they were in former times; less, indeed, than was contemplated by the founder of the university. The existing imperial exhibitions are in number 1,594, instead of 6,400, which Napoleon I intended to found. The communal and departmental exhibitions amount in number to 915 in the lycées, and 302 in the communal colleges (full or part scholarships). To these must be added exemptions from payment enjoyed by day scholars, amounting in number to 1,342 in the lycées, and 2,223 in the communal colleges. In spite of the increase in the population, and in the number of public servants, in spite of the growing necessity that the State should give compensation for the small salaries and pensions of the civil and military functionaries, by taking upon itself the expense of the education of the children of those who have served it faithfully, and who have died in the service; the number of exhibitions has diminished. The 77 lycées of 1865 have 97 less than the 46 colleges of 1842. At this latter period, each royal college had on an average 36 exhibitioners; each lycée has at present no more than 21, that is to say, 15 less. And the actual resources are, indeed, quite insufficient to meet the many demands made upon them. The credits allotted in the budget allow, on an average, 300 nominations annually, and there are every year more than 2,500 petitions for exhibitions regularly inscribed, and founded on good titles.

Such are the views by which the public administration is guided

in respect of the questions connected with secondary instruction; such are the laborious thoughts with which it is occupied, in order to respond to the wishes of your Majesty, who looks upon the progress of national education as one of the most essential interests of your Government.

I ask the Emperor's permission to give publicity to this difficult and conscientious work, in order to invite discussion, and to bring more light to bear on questions the solution of which is so important to the moral greatness of the country.

CIRCULAR LETTER TO THE RECTORS FROM THE MINISTER OF PUBLIC INSTRUCTION IN FRANCE, ACCOMPANYING THE PLAN OF STUDIES FOR THE SPECIAL SCHOOLS.

Paris, April 6, 1868.

M. le Recteur,

I HAVE the honour to transmit to you the general plan of studies which will constitute the system of special instruction, together with the documents relative to the execution of the law of 21st of June, 1865.

I have nothing to say to you, M. le Recteur, on the subject of the programme of the studies; they will speak for themselves. Having been published first previously in 1863, they have for two years been subjected to experience.

Having collected the opinions of the head masters and the principals of schools, the inspectors of academies, and the rectors, the administration has re-cast, in part, the first programmes, and has drawn up new ones, which it has submitted to the revision of the Superior Council of Special Instruction, and subsequently to the Imperial Council of Public Instruction. It is thus doubly sanctioned that the programmes will now be introduced into our schools, and I hope that they will soon cause to be produced a number of short but solid books, which will form the commencement of the true literature of the people.

In examining how these programmes are partitioned among the several years of instruction, you will observe that the general plan of the new studies differs essentially from that of the classical studies.

When a pupil enters the lycée, it is with the intention to go through all the classes successively. We are, therefore, sure of his attention, and of his labours for seven or eight years, and we arrange our methods accordingly. Nearly all the fruits of our classical education would be lost to a pupil who did not finish the entire course of studies in the lycée. But the system of special instruction has been instituted for the benefit of those children who cannot dispose over so large a capital of time and of money. Many of these will not go through the entire course; some may even not attend the school more than one year or two. It has, therefore, been necessary to distribute the subject matters of this system in such a way as to make each year of study a complete course in itself, and to place the most indispensable branches in the first courses, so that if urgent necessity should oblige the pupil to quit the special college prematurely, he would, nevertheless, be sure to carry away with him knowledge that would be of immediate use to him. The studies of the several years devoted to this system of instruction thus form, as it were, a whole, consisting of concentric circles.

You will further remark—

That literary instruction and exercises occupy more time during the

first years, and that the importance of the scientific studies increases with the age of the pupils.

That drawing, which may be termed the writing of industry, has constantly four, and even five, hours devoted to it during the first three years, and six hours during the last two years.

That the common duration of a lesson (*des classes*) is reduced to one hour, in order that the strength of the masters, and the attention of the pupils, may not be exhausted.

Lastly, that these programmes, prepared for the system of special instruction in the lycées and colleges, have been so developed as to be suited for summaries in the superior classes for adults, and to help the masters, who are at this moment giving to France a so memorable example of patriotic devotion.

I need hardly add that these programmes are not obligatory for all the special schools; for, with the exception of certain lessons necessary in all cases, the fundamental character of this system of instruction is that it will vary according to the exigencies of each locality. For this reason, Art. 3 of the law has created a council of improvement (*conseil de perfectionnement*), the opinions of which will always be invested with considerable authority.

I do not think that it is possible to transfer the workshop into the school, at least not into our schools; but I think that in the special colleges the hand may be educated, in like manner as the ear will be educated by means of music, the eye by means of drawing, and the entire body by means of gymnastics. I think, therefore, that it would be an excellent plan to accustom the pupils to handle certain tools, not with the view of teaching them a trade, but in order that their hands, accustomed to use the hammer and the file, the plane and the lathe, may be as ready for the work of the apprentice, as their minds will be for the work of the counting-house or the laboratory.

The system of special instruction will not only be characterized by its programmes, but also by its methods. I call your serious attention to the document in which the methods are stated, which are to be followed in each branch of study. You should recommend the masters never to forget that in the special school the object is not, as in the classical school, to educate men who will make the highest speculations of science or literature their daily study, but merchants, agriculturists, men pursuing industrial avocations, many of whom, besides, by expanding this seemingly narrow education by their experience of life, will reach the level of those who have sought to develop their minds by more disinterested studies.

Throughout the course of this special education, from the preparatory year, onward to the last year, the attention of the scholars must be kept constantly fixed on the realities of life; they must be taught never to look without seeing; they must be made to give an account of the phenomena which take place around them; and they must learn to enjoy so thoroughly the pleasure of understanding that this pleasure will become a necessity to them. In a word, there must be developed in the child that power of observation and judgment which will render him, when a man, at one and the same time, prudent and resolute in all his undertakings, and capable of managing his own affairs.

While the lessons in the applied sciences give this practical direction to his mind, the lessons in history, literature, and ethics will instil into him the desire to rise above the realities of the physical world in order to approach the beautiful, the good, and the Deity, from whom come, and in whom are blended, all perfections.

The fourth document is a resolution (*arrêté*) bearing upon articles 4 and 6 of the law of 21st June, 1865, relative to the granting of the diploma for completed studies to the pupils of the special schools, and of the certificate of capacity (*brévet de capacité*) to persons wishing to open establishments of the kind.

The institution of the diploma for completed studies will give to special instruction that sanction which has hitherto been wanting to it. This authoritative testimonial will indeed have a double effect: it will induce the pupils and their families to continue to the end studies which form together a definite whole, and will tend to make public opinion very soon attach due importance to the possession of a diploma, which, as regards certain public or private offices, and for situations such as those of managers of engineering workshops, of large farms, of commercial houses, will offer better guarantees of immediate capacity than would the diploma of a bachelor of arts.

You will observe, M. le Recteur, that the law does not authorise the granting of a certificate of capacity to any candidate wishing to open a special school, who has not at least attained his 18th year. The law of the 21st June, 1865, makes a difference between the diploma of a pupil, testifying to his completed studies, and the certificate of a master, which gives the right to teach.

The composition of the two juries is also different; the one is departmental, in order that the pupils may not be obliged to undertake expensive journeys; the other is academical, in order that the examination may be invested with greater importance and solemnity.

Articles 3 and 5 of the law of 21st June, 1865, institute a Council of Improvement (*Conseil de Perfectionnement*) in connection with each public school for special instruction. Two things have been done with a view to these councils, exercising an efficacious influence on the studies. In the first place, they will, in accordance with the resolution of 6th March, 1866, have very important functions ascribed to them; and in the second place, the members will be chosen among the notabilities of the locality, and the presidency is specially reserved for the Mayor, in order that municipal influences may be brought to bear freely on these scholastic questions, which interest, above all, the fathers of families, and which, as regards this new system of instruction, are also local questions.

This council will not only give its advice on the subjects of the general programme, which may require to be extended, or restricted, according to the exigencies of the locality; but it will verify the state of the collections and of the library; it will facilitate the visits of the pupils to manufactories, workshops, and farms; it may be present at the lessons and the divers examinations; finally, it will every year address a report to the Minister on the progress of the school.

The Council has another important prerogative; every year considerable sums are devoted to the education of children, very frequently orphans, whose fathers have served the State well, or who give evidence of great capacities, which it is the interest of society to develop. But the sacrifices which the State, the departments, and the communes impose upon themselves in order to educate useful members of society, are sometimes lost, because the youths, who have lived until their 18th year under strict supervision, are deprived of all superior guidance at the very moment of their entrance into real life, that is to say, at the most critical period of their existence, when the college, which has sheltered their childhood, opens its gates and thrusts them out into the unknown world.

It seems senseless to make prolonged and expensive efforts to create a force, in order to abandon it to itself at the very moment when it requires the most to be restrained and directed, that to produce all its useful effects.

In order that the pupils of the special schools may be saved from this danger, the Council of Improvement will also act as a committee of patronage. Any pupil who deserves a paternal, yet severe reprimand, may, by the head of the school, be called before the committee of patronage; but the exhibitioners will more especially be the objects of the committee's solicitude. During the last year of their attendance at school, it will observe narrowly their capacities, will give to their studies the direction most useful to their interests, and will endeavour to obtain for them access to the undertaking in which they will find the best and most fruitful employment for their abilities.

For this purpose, each local committee will be in relations with the superior council, which has its seat in the Ministry of Public Instruction, and which, knowing as well the demand as the supply, may often be able to satisfy both, and may help the pupil who is leaving school to find immediate employment for the knowledge he has acquired.

The corporations of former days were an incumbrance upon industry, but a guarantee to those who followed industrial avocations. The incumbrance disappeared with the guilds: it would have been well if the guarantee could have continued. It will, no doubt, be restored to life, and in a better form, with this organization of a patronage exercised for the benefit of the pupils of the special schools.

When the Emperor Napoleon I, wished to give a higher character to classical studies, he founded the Superior Normal School, out of which have come so many celebrated men, who still form the main strength of the university. When one of my illustrious predecessors undertook, thirty-three years ago, to organize at last popular instruction, he created normal schools for the departments which furnish the primary schools with their best teachers, and the country and the Emperor with the most devoted servants. If, for forty years, special instruction, which has been tried under divers names, has not succeeded in establishing itself definitively, one of the reasons of its failure has been the want of a staff of teachers specially trained for this system of instruction. The foundation of a special normal school will supply this want, and the university will soon be able to provide the lycées, the colleges, and the great communal schools with masters capable of seconding the industrial activity of the country by teaching all the applications of the sciences.

This normal school, like the system of special instruction itself, will have a mixed character. Scholars will be secured for it by means of exhibitions founded by the State, the same as for the normal classical school; but there will also be departmental scholarships, as there are in the normal primary schools. Towns, as well as private individuals, have already founded such scholarships; and the school may also receive free boarders.

The State exhibitioners will enter the special school after a competitive examination; the departmental exhibitioners will obtain admission after a competitive or other examination, the conditions of which will be determined by the departmental authorities. The first-named exhibitioners will remain at the disposal of the State after the completion of their course of study, and during the whole of their ten years' engagement. The others will be at the disposal of the departments and the communes that have provided the means for their education,

but the functions, and the needs in connection with this system of instruction, are so varied, that every pupil issuing from a special school will be sure to find a good and remunerative employment for the knowledge he has acquired there.

Some persons are of opinion that this normal school should be established in Paris; I think it will be better situated in the country. There will be as little want of good professors for this institution as there is for the seventy-two provincial lycées, and at Cluny the pupils will find excellent opportunities for study, without being exposed to the dangerous seductions of a great city, where also they may run the risk of acquiring tastes at variance with the modest habits, and the austere life of a teacher of children.

Three causes have hitherto hindered the development of the system of special instruction. There was a lack of teachers required for the purpose; this necessity has been provided for by the establishment of a normal school. The salaries were wretched; the decree adopted by the Council of State allows of these salaries being raised, and secures to the teachers in the special schools that outward dignity of position which is indispensable for the maintenance of the dignity of the office. Lastly, the teachers were kept in an inferior condition; the resolution of which I am about to speak will cause this inferiority to disappear.

In order to have good teachers, it is not sufficient to give to them the instruction which they will afterwards have to impart to others, and to secure to them in return for their services remuneration in accordance with that received by the functionaries connected with the other branches of public instruction, care must further be taken to honour their condition by elevating it in the eyes of others, and to open to their legitimate ambition access to the titles and honours which the university bestows upon proved merit.

In accordance with this view a special degree has been created, in order that this branch of instruction also may have its crown. The same step was taken last year, from the same motives, in favour of living languages and foreign literatures.

The law of 21st June, 1865, having made special instruction a branch of secondary instruction, it is but just that the benefits of the imperial, departmental, and communal exhibitions should be enjoyed by meritorious pupils, whose families, whose fortunes, or whose capacities do not allow them to aspire to enter those careers to which the great schools give access. It will be a combination, at the same time paternal and useful, which will allow of fathers being rewarded in their children, without pushing the latter fatally towards professions, which, owing to the ulterior sacrifices they may call for, are not always in harmony with the position of lowly servants of the State. Besides the special studies do not extend over so long a period: more exhibitions may therefore be founded with an equal sum, which is the same as saying that a larger number of families may be assisted. Lastly, the pupils who will be in the enjoyment of these special exhibitions will be more sure of turning to account, immediately on leaving the lycée, or the college, the knowledge which they have acquired there, while access to the higher studies will not be unobtainable by those among them whose remarkable abilities may render them objects of special solicitude to the administration.

I trust, M. le Recteur, that all these measures taken together, will definitively establish a system of secondary instruction for the people. It is time that we should make speed. In the peaceful, but redoubtable struggle, in which the various industrial nations are engaged, victory

will not be to that one who can command the greatest number of hands, or the greatest amount of capital, but to the nation whose working classes are the most orderly, the most intelligent, and the best educated.

Science continues its discoveries, and every day places at the disposal of industry new and serviceable agents; but in order to be well applied, these agents, which are sometimes very delicate, and sometimes very powerful, require to be skilfully handled. This is the reason why in the present day industrial progress is so intimately connected with educational progress; and why questions, which it is the duty of the university to examine and to solve, have acquired so great in importance even as regards the material prosperity of France.

Should any one doubt the importance of the revolution which is taking place, let him look at Switzerland, that country of lakes and mountains, which nature has made so beautiful, while at the same time denying it every condition required to make it the abode of industry; a country loved by artists and by poets, but without poets, without navigable rivers, without canals, and without mines. Yet, from among these sterile rocks, there is exported every year an amount of products sufficient to pay for all the importations made, and more especially for the 200,000,000 francs' worth of goods, which France alone sells to that people, which in fomer times cultivated mercenary warfare as its sole branch of industry; and the country produces besides so many skilful men, that in every commercial city of the world a Swiss colony is found holding the first rank, and in almost every great commercial house may be found intelligent clerks, who have come from Basle, Zürich, or Neufchatel.

For in Switzerland every labourer knows how to read, and no one hinks of leaving school before the age of fifteen or sixteen

(Signed) Le Ministre de l'Instruction Publique,
V. DURUY.

Methods of Instruction Prescribed for the Special Schools in France.

Preparatory Year.—Subjects of Instruction.

French dictation and reading	6 hours weekly.
Modern languages	4 ,,
History of France (simple narratives) ..	1 ,,
Geography: tracing of the map of the Department, and summary study of France ..	1 ,,
Mathematics: exercises in calculation and commencement of plane geometry	4 ,,
Natural history (preliminary notions) ..	2 ,,
Caligraphy	4 ,,
Drawing	4 ,,
Gymnastics	2 ,,
Singing	2 ,,
Total.. ..	30 ,,

The children leave the primary school at the age of eleven or twelve, having taken the first communion and having learnt their catechism; they know—

1. Elementary grammer.

2. Arithmetic, that is to say, the four fundamental rules in whole numbers, fractions, and decimals.

3. The system of weights and measures (*le système métrique*).

This is the common foundation of all primary instruction, and upon this basis special instruction is to rest. Some schools add to these elements a little geography, sacred history, and the measurement of the simplest plane figures, but these schools are in very small number, and the supplementary instruction which they impart is taken in by a few select pupils only. A child would, therefore, run the risk of not being able to follow with profit the new course of instruction if, on leaving the primary school, he were at once to enter the first year's course in the special school. It will, therefore, be proper to institute, wherever there is such a school, a preparatory section, in which, in addition to having the instruction received in the primary school more firmly impressed upon the mind, the children shall learn one modern language, a little geometry, and linear drawing, which is in reality the practical carrying out of the course of geometry. During this year, the pupils, whithersoever they may come, who will form the preparatory section, will be fused into a homogeneous whole, because they will acquire knowledge almost uniform, and good scholars will thus be secured to the first normal course of the special instruction.

FRENCH LANGUAGE.—*Dictation and Reading.*—The lessons in grammar should be limited to repeating of the paradigmes, the declinations and the conjugations. As to the syntax, that is to say the synthetical laws which rule the language, the master should merely point out the practical rules each time an opportunity occurs, avoiding all abstract formulas, which children have great difficulty in retaining, which they understand imperfectly, and which they forget speedily.

At the age of twelve or thirteen the child has already mastered, by use, the *natural* grammar of the rules of which he is ignorant, though, without knowing it, he daily applies the most important of them. In order to enable him to make enlightened practical use of the language, it will be sufficient to draw out, as it were, this natural grammar, and to engrave insensibly and without effort on the mind of the pupil, principles and rules, which he will more readily retain, because he has in a manner found them for himself, and understood them by himself.

The principal exercises will be dictations and reading. Select passages from history, ethics, mythology, natural history, should be dictated to the pupils, and explained by the master, with reference to the meaning of the contents and of the words. These passages should be short, simple, and consisting of ideas clearly defined and circumscribed within the limits of one or two lines. Immediately after the dictation the pupils should exchange their copybooks, and after having reciprocally corrected them, they should deliver them to the master, who should return them the next day after having noted in the margin the errors committed by the pupil who has written the copy, as well as by the one who has corrected it.

The dictations should occupy the first part of the lesson, the second part should be devoted to reading, which is an important study, inasmuch as only that which is well understood can be well read; it is besides very useful in the ordinary course of life to be able to read aloud intelligently, distinctly, and with taste. Besides, in special instruction the reading of a French passage is to hold the same place, and is to be of the same service, as the expounding of a Latin or Greek passage in the classical schools.

The professor should himself read out aloud a well chosen extract,

should explain it so as to make the pupils well understand the ideas of the author and their sequence; should point out the most important passages, and the most striking expressions, and should deduct from them the principles of orthography, and some grammatical rules. At the conclusion the pupils should be made sometimes to read the same passages, sometimes to repeat from memory the principal thoughts contained in them, as also of the commentaries on them made by the master.

The task to be prepared for the next lesson should be the reproduction in writing, and always from memory, of the passages that have been read and explained, to which the pupils must endeavour to add, unaided, the thoughts to which the extract would naturally give rise. The length of this task should be in proportion to the amount of time at disposal, in order that it may be, not only an exercise in composition, but also in orthography and in caligraphy.

Modern Languages.—The study of languages ought to commence early, because the memory of children retains words with great facility. The method to be followed is the *maternal* method, which is practised with so much success in Germany and in Switzerland, and which is being introduced in the lycées; little or no grammar, except perhaps the paradigmes, but a great deal of oral practice; after this, sentences dictated by the master and written on the black board by a pupil, who should at the same time translate them; further on, anecdotes should be learnt by heart, and repeated aloud, a few passages should be read aloud by one pupil, and immediately translated into French by his fellow-pupils; subjects should be given in French and be treated in the language which is being learnt; finally, when the pupils are sufficiently advanced, they should converse in that language with the master, being strictly forbidden to use one word of French.

During the very first lessons the pupils may become possessed of elements sufficient to form short sentences. With the two articles, the two verbs "to be" and "to have," some nouns and adjectives, the number of which would increase with each lesson, the *practise* of the foreign language may commence.

The professor ought never to forget that he may also extend the knowledge of the children, and contribute to develop their faculties by the selection of thoughts and facts which he may combine with the study of a language. From the very commencement he ought to introduce into conversation (which is to be the usual form of his lessons) details borrowed from history, commerce, geography, industry, sciences, natural history, &c. The study of a language becomes thus not only a study of words, but a study of things; and the words penetrate into the mind of the pupil with the facts calculated to awaken his interest, and to furnish an incitement to his curiosity. The memory is not alone called into play, as would be the case by the abstract study of grammar, which is not suited to children, whose intelligence ought to be stimulated by a first sight of things belonging to the outward world, and whose nascent powers of thought ought to be fortified by concrete notions, the causes of which they will afterwards seek for with eager curiosity.

History of France (*simple narratives*).—Everybody knows how fond children are of listening to narratives, to the accounts of hunting or travelling adventures, of storms and battles. They wish them to be repeated, they follow the story with inexhaustible interest, and if the narrator forgets the smallest incident, they at once call him back to the accuracy of the first narration. Availing himself of this natural

curiosity to develop at one and the same time the moral and the intellectual capacities of his pupils, a skilful teacher well knows how, by means of the study of history, to exercise a most salutary influence on their intellect and their heart, at an age when the agitating events of life have not yet disturbed the calm transparency of the soul. But, if this double result is to be obtained, the study must be made interesting, pleasant, animated, and consequently the system of textual rehearsals must be abandoned. A course of history for children of the age referred to, is not to be a critical course. *It should consist of isolated facts and detached biographies which the master should narrate with simplicity*, but with art, taking care to give great prominence to the noble qualities of the celebrated characters, and to leave in the shade their faults and their vices. He should not fear to enter into minute details, for these interest children; but he should dwell on the grand traits that will strike their imaginations, and leave a deep impression; finally, he should wind up with some good thoughts, which will by degrees form in the hearts of the pupils a fund, as it were, of practical morality.

In order to accustom the pupils to connect their thoughts, and to speak fluently, the master should, during the lesson, make them repeat his narrative aloud; in order to accustom them to express themselves in writing, he should request them to write a short abstract of the narrative, in which they ought not to omit the observations to which it has given rise. This abstract should, as has already been mentioned, serve at one and the same time as a writing copy, and as an exercise in spelling.

GEOGRAPHY.—*Tracing of the map of the department, and summary of the Geography of France.*—Instead of beginning with definitions and general considerations of the form of the earth, and the divisions of the globe, the pupils should in this, as in the grammar lesson, proceed from the known to the unknown, from the simple to the complex; should start from their village in order to arrive at a knowledge of the entire globe, studying first the geography of the *canton*, the *arrondissement*, the department, then of the whole of France, and then of the surrounding countries.

The teacher, setting aside all scientific data, should endeavour to make his pupils understand how a geographical map is really constructed, and what is its use. For this purpose he should trace upon the black board the largest streets in the village, or the town in which the school is situated, and should mark with a dot the relative positions of the principal buildings. Then, representing the town itself by a dot, he should place in their respective positions the surrounding villages, beginning with those best known, and going on successively, till the limits of the canton be reached. He should indicate by lines the different roads leading to them, the rivers that run past them, and should fill up his outlines by introducing the most important or remarkable buildings, or the physical features of the country, such as woods or forests, hills or mountains.

Next, the canton should be represented by a dot, as the village was in the first instance, and around this dot should be traced the outlines and features of the *arrondissement*. The same method should be applied, but with fewer details, to the department, and then to the neighbouring departments, and finally to the whole of France, which should then be studied in its *ensemble*. The principle traits of its general configuration; boundaries and mountains, rivers and watercourses, great cities and celebrated places, should be marked on the black board, or shown on a wall map, which the pupils should be exercised in reducing.

To these graphic studies the master should add practise in finding the points of the horizon, which is indispensable for understanding a map thoroughly. He should teach the pupils to find the points by the sun, by the polar star, or the compass; should point out that on maps and charts, the north is generally represented at the top, the east on the right hand side, the west on the left, the south at the bottom, &c. To such purely graphical exercises the course of geography in the preparatory division should be limited.

MATHEMATICS.—The instruction herein consists during the preparatory year far more in practical exercises than in theoretical lessons; all the pupils execute simultaneously on the slate with which they are furnished, the calculations and graphic operations indicated by the master.

Practical Arithmetic.—The four operations by whole and decimal numbers; numerous exercises in mental calculation; application of calculations to the solution of ordinary questions. As tasks, some problems.

Plane Geometry.—1. *The straight line.*—Drawing a straight line on paper; means of verifying whether a rule is quite straight; use of the metre. Drawing a straight line of a certain length; means used by carpenters for drawing straight lines on beams which they have squared; drawing a straight line on land (*sur le terrain*); how gardeners, trenchers, masons, &c., draw straight lines; proceedings employed in making plans and surveys; the surveyor's chain, &c., &c.

2. *The Circumference of the Circle.*—Drawing the circumference, use of the compass, examples of circles, waggon-wheels, mill-stones, &c., examples of semi-circles, the arcades of many buildings, two circumferences of equal radius or equal diameter are alike, &c., division of the circumference into degrees, example, the dial of watches, &c.

3. *Angles.*—Use of the protractor, its verification, relation of two angles, angles opposed at the summit, &c.; to make two equal angles, application to drawings, to the plans of architects, &c.

4. *Perpendiculars and Obliques.*—Drawing of perpendiculars with the simple square, the T, and the compass, to raise a perpendicular on the middle of a plane, carpenter's and stone cutter's square, joiner's and designer's square, their verification, each point of a perpendicular in the middle of a plane is at an equal distance from the two extremities of the plane, &c., oblique lines (*obliques*), at equal distances from the foot of the perpendicular, drawing equal oblique angles (*obliques égales*), unequal oblique angles, verification of the perpendicularity of a straight line by means of equal oblique angles, &c.

5. *Parallels.*—Drawing parallels with the help of rule, square, and compass, two straight lines perpendicular to a third are parallels, to draw through a given point a parallel to a given straight line, &c., the instrument for measuring tenons, its use, and its verification, equality of alternate internal angles and alternate external angles.

6. *Proportionality of Straight Lines* (*des droites*).—To divide a given straight line into a certain number of equal parts. Construction of the scale of a plan, a fourth proportionate to three straight lines, the compass of proportion, its use, proportional mean, &c.

Before commencing the explanation of theorems, the master should make the pupils understand the truth which he is about to establish, by quoting numerous examples from industry or the arts, and by the side of each proposition he should always place the most useful applications which have been made of it.

Natural History.—Preliminary notions. It is from nature that industry and art draw their means of action; natural history addresses

itself to all minds, as to all ages, and to nearly every profession, a taste for it should, therefore, be given to children at an early age.

This science may be taught in various ways, but it should never be forgotten that in the special school the object is not to form consummate anatomists, learned geologists, or botanists and zoologists acquainted with the entire nomenclature and all the problems of physiology, but men who, meaning to devote themselves to the intelligent culture of practical affairs and the industrial arts, have a great interest in learning to observe correctly, and to fix their attention seriously, on the processes of nature.

In order to develop the powers of observation of the children, the master should induce them to avail themselves of their walks to collect insects, plants, shells, and other like objects. He should devote two or three of the class hours each month to the examination and classification of these little collections, and should add a few explanatory remarks within the comprehension of the pupils. He should insist on the logical use of certain characteristics for determining the objects, and thus gradually and practically familiarize the children with the use of the natural methods; finally, he should endeavour to habituate them to reason correctly according to the facts which they have well studied, and always to submit their reasoning to the test of experience.

In the classes of the preparatory year the professor of zoology should choose for subjects of his conversations the natural history of animals which the pupils have constantly under their eyes, such as the horse, the dog, the cat, the mole, &c. He should at first merely touch upon isolated facts calculated to rouse youthful curiosity, and to give the pupils the habit of accounting sensibly for that which they observe; then he should proceed to a comparative examination of two or more animals which are like each other in some things, but which differ from each other on other points. He should explain, while indicating the relative importance of each point of resemblance and of dissemblance, how one may, by means of classification, summarize the knowledge one has acquired and group the individual facts, so as to relieve the memory to put order into one's ideas, and to rise gradually to correct generalizations.

Thus with the study of the horse its character and the services which it renders to man should be combined; details as to the habits of wild horses, and as to the means of taming them, as also comparative remarks on the horse, the ass, and the zebra, in order to awaken the idea of families of animals, or genera. When the master has sketched the history of the dog, pointed out the acuteness of its sense of smell, its uncommon intelligence, and the effect of education on the development of its faculties, he should dwell on the qualities which the bull dog, the shepherd's dog, the spaniel, the terrier, the greyhound, and the poodle have in common, and whence it will be easy to draw an exact notion of the species. The cat should be compared with the tiger and the lion. The mole, the appearance and the habits of which should be described; the swallows and the charming history of their periodical migrations; the frogs and their metamorphoses; the cockchafer and its ravages; the silkworm and its useful cocoon; the bee and its honey; the inhabitants of the poultry yard, the birds of passage, &c., will form most interesting subjects of conversation.

The lessons in botany should be given in the same order and in the same spirit. The professor should choose a few plants known to every one; he should induce the pupils to gather these for themselves, and during his lesson they should have constantly before their eyes either

the plants or coloured plates of them, giving the *ensemble* as well as the details. It seems natural first to fix the attention of young pupils on an active phenomenon, such as the germ, which is susceptible of being reproduced and examined in all its principal circumstances, in the bean, in corn, in Indian corn, the horse chesnut, &c. The special history of certain plants, selected according to locality and season, and studied in their entirety and in their applications, will afford the master an opportunity of making known the general part played by the root, the stem, the flower, and the fruit, as also their essential modifications. He should commence with the study of plants bearing large flowers, such as almond, peach, apple, pear, and cherry trees, the strawberry plant, the rose bush, the comparison of which will awaken in the mind of the pupil the idea of natural families of plants, peas, beans, and other common leguminous plants, colza, mustard, and a few other cruciferæ, the peony and poppy, mint, rosemary, thyme, sage, and some labiated plants, the potatoe and tobacco plant, the artichoke, nettle, and daisy, beetroot, hemp, the lily, garlic, and the tulip, &c., and finally some common plants, the analysis of which is more difficult, such as wheat, oats, barley, Indian corn, all these may serve as tests for useful remarks relative to their structure, their duration, the uses they are put to, and the particulars regarding those parts of them which are made available by man. Among trees the oak, the walnut, the maple, the pine, the fir, &c., furnish equally interesting examples.

In *geology* the same method should be followed. The examination of existing phenomena will help to make the pupil understand how many parts of the earth have been formed. Thus, after a violent shower of rain, the master may point out that the loose earth carried away by the currents form alluvion on the banks, or in the beds of rivulets, and rivers, and particularly at the mouths (deltas of the Rhone and of the Nile); that these deposits overlie each other and are constantly rising in height (stratification), and that animals which live in the water or have their habitations near the sea, must frequently be buried in the alluvion; hence the origin of fossils. The water spread over the earth is always undergoing evaporation, forms clouds, and falls again as rain or snow, which is imbibed by the soil. Formation of springs, of rivulets, rivers, &c. The rain-water dissolves certain substances which it encounters in the earth. Incrustations.—On high mountains the snow remains perpetually; glaciers; artesian wells, the water in these is tepid; thermal springs; central heat; volcanoes; metallic mines, &c.

Caligraphy.—Commerce and industry demand, with right, a good handwriting of the persons they employ. In the schools for special instruction, the handwriting of the pupils will be the object of particular care; there will be four writing lessons in the week. As the art of symbolising words by the use of conventional characters is a purely imitative art, in order to hasten the progress of the children, those whose writing is defective should be mixed with those who write better. During the first years the length of the tasks given should be limited, so that the master may exact a very careful execution, and so that every task should be an exercise in caligraphy.

Instead of giving as copies insignificant and disconnected phrases, a series of moral maxims should be composed, and expressed in a way easily retained in the memory, or very short fragments relating to industry, to history, or to the natural sciences. The pupils should collect these copies into books, which they will perhaps, at future periods, consult with pleasure.

Drawing.—The pupils of the special schools should learn to handle

the pencil as well as the pen. Only on this condition will they acquire that firmness of hand and correctness of eye which will be of so much importance to them in their future careers.

As among the pupils who frequent these schools there will be future foremen, to whom a knowledge of the use of the rule and compass is indispensable, the lessons in free-hand drawing should alternate with exercises in linear drawing.

These exercises should be made on the board with wooden instruments, foot-rule, square, &c. The subjects of study will only admit of two dimensions, and should be chosen so as to enable them to be constructed with the help of a few, simple data. To join two straight lines, to develop a broken line; to trace perpendiculars and parallels with the compass; the division of straight lines; proportional lines; construction of a scale of proportion; division of arcs and angles, &c.; horizontal and vertical lines; the diagonal of the square, octagons, starred polygons, &c., &c.

Free-hand drawing, which should occupy the greater part of the time, should comprise parallel straight lines, and curved lines parallel to each other, the division of lines into equal parts, measured by the eye only; the first outlines of the face, the veins in leaves, very simple architectural roses (*rosaces*), the stems of plants, some animals, &c., &c. A series of well graduated ornaments lithographed in *alto relievo*.

But it is not sufficient to train the eye to see correctly, and the hand to execute well, the taste for the beautiful which is to direct their future artistic creations, must also be instilled into the pupils. Care should therefore be taken that the lithographs, engravings, and plaster models, given to them to copy, should always be excellent of their kind, and of simple execution, and the forms should never be concealed under unnecessary shadings (*crayonnage*). This choice of models is of the greatest importance.*

Gymnastics.—Gymnastics are to the body what study is to the mind. The intellect is fortified by exercise, and the body develops itself more normally if, at fixed hours, it be made to go through regular movements. Now the mind itself is the gainer if the body perform its functions regularly. Gymnastics are therefore a duty as well as a hygienic recreation. Every special college should have a gymnasium, and, as nothing connected with the important matter of education, whether mental or physical, should be left to chance, the programme of the lessons in gymnastics has been elaborated with the same care as that of the other branches of instruction. If, indeed, a certain amount of gymnastics is favourable to the development of nature, there is reason to fear that an excess of these exercises may injure this development, just as the mind is injured by excess of study. The pupils in the preparatory division should only be put through gentle and easy exercises, and these should be accompanied with singing. The rhythmic cadence which regulates these common movements, has even an effect on the moral nature of the children, and the efforts which they make to emit the tones in singing, exercise a progressive and salutary influence on the respiration, by causing a periodical expansion of the chest. Placing themselves in a row, with or without intervals; marching, with accompaniment of songs; rhythmical running, but never long enough to cause fatigue; movements of the arms and legs, accompanied by singing; series of exercises preparatory to swimming; principles of jumping on the spot, or leaps, preceded by a run; series of exercises with dumb-

* The forming of a complete collection is in contemplation.

bells, of a weight proportionate to the age and strength of the children, &c., &c.

SINGING.—Singing is a powerful means of education. All the special colleges will therefore comprise singing classes. Each lesson should commence with singing in unison, in order to steady the voice; the pupils should be grouped according to the capacity of their voices, and each group should, in its turn, go through the exercises prepared. The lesson should conclude with the practise of easy and melodious choruses. During the preparatory year there should be taught a few principles, and many tunes of a simple and agreeable character, set to good words, but very little musical grammar. As for the method to be employed, it must, provisionally, be the one that the master knows best how to apply.

I.

FIRST YEAR OF INSTRUCTION.

French—continuation	5	lessons	weekly.
Modern languages	4	„	„
History—The great epochs of ancient Greek, Roman, and mediæval history	2	„	„
Geography—The five divisions of the globe. Detailed study of the geography of Europe	1	„	„
Mathematics—Arithmetic and plane geometry—continuation	5	„	„
Preliminary notions of physics and chemistry	2	„	„
Natural history, zoology (vertebrate, the principal mammals) botany, geology	1	„	„
Caligraphy	2	„	„
Drawing	4	„	„
Gymnastics	1	„	„
Singing	1	„	„
Total number of lessons	30	„	„

EXAMINATION FOR ADMISSION.—The weakness of pupils admitted into a class reacts throughout all the ensuing year, and insensibly lowers the level of the studies. In consequence, every pupil who presents himself for admission to the first year's course, shall write a composition from which it may be judged whether he will be able to follow the lessons with advantage. The composition should bear upon the French language and upon arithmetic; the subjects should be given by the professors of the first year's course, whose opinion is mentioned in the *procès verbal* sent to the rector.

RECAPITULARY LESSONS (*Leçons de Révision*).—The professors should commence their course with a few recapitulary lessons. This return to the matters taught the preceding year is, it is true, more useful when the master follows his class, and every year advances one step forward with them. This system which, for diverse reasons, the university has abandoned, has, nevertheless, its advantages, for it enables the master to acquire a more thorough knowledge of the character, the nature, and the intellectual capacities of his pupils; it gives time for the development of sentiments of good will and affection,

which render the task of instruction easier. Living during several years with their pupils, the masters become attached to them, take an interest in their progress and in their future prospects, as matters specially concerning themselves. The success of the pupil becomes thus a matter of honour to the master. This old system which has been preserved, and with some success, in the Polytechnic School, and also in classical schools which are not connected with the University, might, to a certain extent, be adopted in the special schools.

FRENCH (*continuation*).—The lessons given during the course of the preceding year should be continued according to the same method, and in the same spirit. The first part of the lesson should consist in dictation. The pupils should correct each other's copies, the master should examine the corrections, and the next day return the copies with his remarks upon them. The second part of the lesson should consist in reading, whence a few grammatical rules should be deducted, more especially such as will admit of the whole terminating with a practical maxim. The pieces selected for dictation, and for reading, should be longer, and more difficult than those of the preceding year.

The task given should be repeating by heart the fragment read in the class.

MODERN LANGUAGES.—The same general direction should be followed as previously indicated for these languages.

The pupils of this class should each in turn write on the black board a translation of a sentence dictated in French.

The task should be to learn by heart a fragment to be recited during the next lesson.

HISTORY.—*The great epochs in ancient Greek, Roman, and Mediæval History.*—It is generally recognised that literary studies exercise a most powerful influence on the development of the mind and the heart; therefore in the combination of the divers parts of the programmes of the special schools, as a general rule almost equal parts have been assigned to literature and to science. Besides, the pupils of the special classes ought not to remain entirely ignorant of the important events that have marked the course of centuries, or to leave school without having heard of the great men who have influenced the destinies of empires. But, as such a plan embraces the entire world, the master should limit himself to a few short narratives calculated to make a strong and vivid impression on young minds, and to constitute a course of practical morality.

Thus after having devoted a few lessons to the recapitulation of sacred history, which has been carefully studied in the primary classes, the teacher should point out Egypt, and its most remarkable monuments; Assyria, with the far-famed names of Semiramis and Sardanapalus; the Persians under Cyrus and Darius; Greece, which in Lycurgus, Solon, Miltiades, Aristides, Themistocles, and Pericles, will furnish him with fine examples to cite. He should mention the battles of Leuctra and Mantinea, of Granica and Arbelles, and move on rapidly to Roman history, which he should sketch in broad outlines; the foundation of Rome, Cincinnatus, Fabricius, the Decii, &c., the Punic Wars, the Gracchi, Cicero, Cæsar, Augustus, Trajan, Marcus Aurelius, and Constantine. Then the barbarians, Attila, Genseric, and Clovis; finally, Justinian, Charlemagne, Godfrey de Bouillon, Saint Louis, the capture of Constantinople, &c.

The effect of this course will be to make known to the pupils of the specials schools, certain names and certain facts which are constantly

recurring in books, in museums, in works of art, even in every-day conversation, and of which no one ought to be ignorant.

GEOGRAPHY.—(*The five divisions of the Globe; detailed study of the Map of Europe.*)—France having been studied the previous year, the general map of Europe should now be traced on the black board, then successively the map of Asia, Africa, America, Australia, and lastly the map of the world, or the planisphere; but the only details given should be the great mountain chains, the most commonly-known rivers, and the capitals of the principal states.

After the pupils have acquired this general knowledge of the great continents and seas, the master should lead them back to a more detailed study of Europe, and particularly of the regions surrounding France, with which her relations are most frequent. He should continue to mark on the black board, or later on small maps the great physical features, and then the principal cities dwelling on their industrial or commercial importance.

For their tasks the pupils should be given *dumb* maps, the names to be applied from memory, and maps to be copied. These copies should be true free-hand sketches, without any scientific pretensions, and not manuscript editions of engraved maps, to produce which would be to lose much time in carrying out a false notion.

MATHEMATICS.—*Arithmetic.*—Exposition, still elementary, but already in a certain degree based upon reasoning, of the four operations with whole and decimal numbers; study of fractions;—the metrical system; rule of three, rule of society, of interest, and of discount according to the method of reduction to unity; notions of relations and proportions. As tasks, numerous problems relating to common questions.

One part of the lesson should always be devoted to practice in mental calculation.

During this year also very difficult and delicate demonstrations should be avoided in these lessons, as also such synthetical and abstract definitions which ordinarily are merely retained by the memory.

So also in geometry, the teacher should admit as sufficient demonstrations by superposition, and should take evidence as his basis, whenever it is possible so to do. In a word, he should not forget that his pupils are of the age of fourteen or fifteen, and that they are destined for practical work.

GEOMETRY.—*Of the Circle.*—To trace from a given point as a centre, a circle which shall intersect a straight line at a given point;—a circle which passes through three given points, &c.;—to divide an angle into two, four, &c., equal parts, &c.

The Inscribed Angle.—Measure of the inscribed angle;—every angle inscribed in a semicircle is a right angle;—to find a proportional mean of two given straight lines;—to raise a perpendicular on the extremity of a straight line which cannot be prolonged, &c.

Tangents.—Every straight line perpendicular to the extremity of a diameter is tangent to the circumference;—a tangent common to two circles;—bisector of the angle of two tangents;—application to the operations of the turner, &c.

Circles being tangents to straight lines.—Concentric Circumferences.—Circles which intersect each other, or which touch each other.—Describe a circumference which passes through two given points, and is tangent to a drawn straight line, &c. The line of the centres of two circumferences which intersect each other is perpendicular to the common chord in its middle, &c. To draw cog-wheels which catch either into other cogged wheels, or into pinions, or into trundles, &c.

Of the Triangle.—The sum of the three angles of a triangle is equal to two right angles, &c.

Of similar Triangles.—Two triangles are similar when the angles of one are equal to the angles of the other, &c.

Of Quadrilaterals.—The sum of the angles of a quadrilateral are equal to four right angles, &c.;—of the symmetrical trapezium;—curved roofs, tenons, mortises, &c., are symmetrical trapeziums; of the lozenge and its properties; of the right angle and the square; the facets of dice, the points of a backgammon board, &c.

Of Polygons.—Of *regular* polygons. To inscribe and circumscribe regular polygons on a circumference; to divide a given circumference into equal parts, &c.

Of Starred Polygons (polygones étoilés).—To deduct a regular, starred polygon from a regular ordinary polygon, &c.; equality of polygons; equality by symmetry; division of polygons.

Similarity of Polygones.—To draw a polygon similar to another. Making plans on the circumferentor (*Lever des plans sur la planchette*). Application to the drawing of architectural roses, gothic crosses, &c.

Measurements.—Measurement of lines and surfaces. Surveying and levelling.

The figures of which mention has been made in this course, all of which are much applied in arts and manufactures, should be drawn with rule and compass during the lessons in linear drawing.

It will be understood that, unless in exceptional cases, the professor of mathematics will not be able to take all his pupils into the country to carry out those practices in surveying which complete the course; but every Thursday, when the weather admits of it, some hours should be employed in practical operations in the grounds.

PHYSICS AND CHEMISTRY.—*Preliminary Notions.*—To awaken the curiosity of children, and to call forth in them the taste for observation, it will be sufficient that the professor should point out to them nature in full activity around them, and should fix their attention on the physical and chemical phenomena of which they are every day unconscious witnesses. He may also, without going beyond his subject, explain to them the use of the instruments and apparatus most commonly employed, and may fill his lessons with interesting experiments.

Physics.—The first part of the year should be devoted to imparting to the pupils general notions of the most important properties of matter, such as weight, density, pressure, compressibility, and electricity; but he should take for his starting point phenomena known to the pupils, and should make them help to discover the explanations. Following up this rule, he should speak to them of dilatation, of fusion, of ebullition, and of conductibility; he should demonstrate by experiment the principle of Archimedes; he should explain the use of the barometer, of the pneumatic machine, and of the thermometer, and should conclude with the elementary phenomena of electrical statics. In conformity with the rules which are to guide these lessons, he should take care to derive the principle of Archimedes, of the barometer, &c., not from the properties of matter, looked at from an abstract point of view, but from the problems proposed to Archimedes by King Hieron, Galileo by the guardians of the fountains in Florence, &c.

Chemistry.—Instead of commencing this preparatory course with the nomenclature, and an explanation of the diverse systems of crystallisation, of definite and multiple proportions, &c., &c., the master should dwell on the number of chemical notions which the children have

acquired from practical life, without being aware of it; he should endeavour to render these more precise, and teach the children to draw from them the most direct consequences, and he should point out to the pupils, by means of simple, inexpensive experiments, easy to reproduce, that there are bodies that are homogeneous, and others that are composite; that metals are indecomposible bodies, and that certain non-metallic bodies are in the same case; that chemists distinguish between acids, bases, alkalis, and salts; that heat liquefies and volatilises; that there are fluids which are liquid, and others that are viscous; that there are two kinds of dissolution—one that does not alter, and one that does alter bodies; that there are substances which are soluble, and others that are insoluble; finally, that to unite two bodies is to make a synthesis, and to separate two bodies is to make an analysis.

The instruction given this year should include neither measure nor number, but should be limited to simple ideas, which the master should endeavour to make comprehensible by means of lucid and well executed experiments.

Natural History.—The minds of the young people having been prepared by a more attentive observation of all that surrounds them, and their curiosity having been awakened by what they heard in the lessons of the preceding year, the professor should now commence a regular course of natural history, still keeping in mind that though his lessons are to be a little more scientific, he should not allow them to lose the character of interesting conversations. He should consequently endeavour to render science accessible, by concealing those of its features which might seem too abstract, while, at the same time, taking care that the details given should not suffer in accuracy; and he should fix the facts taught in the memory of the pupils by constantly referring to the phenomena observed in daily life, and which bear on the needs of domestic economy; finally, he should accustom the children to put order and method into their observations and their studies.

During the winter, the pupils should be occupied with zoology (*vertebrata, principal mammals*). After having imparted some general notions of the principal organs of an animal, such as the stomach, the intestines, the liver, the lungs, heart, &c., the master should fix the rules of classification: species, genera, families, orders, classes. Then a summary study should be made of the internal framework (*charpente interieure*) of the vertebrate animals. The principal differences should be pointed out which exist between animals having an internal skeleton: vertebrata covered with hair or fur, which are all mammals; vertebrata covered with feathers, which constitute birds; vertebrata with scaly skins, which are nearly all reptiles, amphibiæ, or fish. The groups of the most useful and the most interesting mammals should be dwelt upon, such as the quadrimana, carnivora, ruminants, and the principal aquatic mammals. A recapitulation of the natural classification of mammalia should then be gone through.

The demonstrations should be made as much as possible with the aid of stuffed animals, or of artificial parts of animals; or when this is not possible, with the aid of coloured pictures of large dimensions.

The course should terminate with the history of man, and of the various human races.

In botany the professor should make known the external character and the principal organs of plants, the structure and the functions of the parts through which they derive their nutriment, and which cause their growth—root, stem, leaves. He should make a careful study of

the parts that serve for reproduction—flower, fruit, seed. When examining the variations which each organ of the plant exhibits in accordance with its species, and with the diverse processes of culture, the professor should point out the uses to which those vegetable products are put which are employed in human industry. Roots, bulbs, and edible onions; textile fibres derived from herbaceous stalks; woods, leaves serving for food and forage; flowers, fruits. The enumeration of all these affords an opportunity of instilling, by observation of common objects, all the most useful notions relative to the anatomy of plants, the composition of their tissues, and the laws which determine the relative disposition of their diverse organs, or of the parts of these.

In the course of geology, the particular tract of land in which the school is situated should be studied. The pupils should learn to distinguish the formations that surround them, to recognize the order of superposition and the differences of stratification in the different beds, the nature of the fossils found in them, and the deductions which may be drawn from these. Finally, during the excursions to which the study of this branch gives rise, the pupils should be practised in collecting for themselves minerals of well defined character, in taking notes, and in making sketches of the arrangement of the rocks and the beds which they examine. Such personal observations enable them, in the following years, to understand by means of specimens, or of drawings, that which may be told them about countries and geological districts which they may not have an opportunity of examining directly.

Commercial Accounts.—*Practical Exercises.*—Explain that commerce is but a succession of exchanges: first merchandize for merchandize, in the beginning of societies, subsequently merchandize for money; peace and prosperity engender credit; sales to be paid in a given term; the accounts of each person then consists of what he owes, and of what is owing to him; meaning of the words debtor and creditor; active and passive; necessity of taking note of the sums to be received, and of the payments to be effected; what is understood by debiting and crediting; balance of accounts; balance to the debit, &c.

Synoptical table of the principal operations of commerce, buying and selling, forwarding merchandize, paying and receiving, to subscribe, to take, to negotiate, &c.

An invoice, what it is, what is understood by the sum total, sale at so much per cent., remission of so much per cent., brutto weight, net weight, tare, show models of current accounts, of bills of exchange, and drafts to order; explain the meaning of the words drawer, drawee, endorsement, endorser, due date, mean date of payment.

The object of this elementary course is to teach the pupils to make some of the calculations which occur in commerce, and to write invoices, accounts of sales, bills of invoice, &c., in a word, to make them acquainted with all those details which constitute bookkeeping, properly so called. The professor should satisfy himself by numerous questionings, that all his explanations have been well understood; he should make the pupils practise a great deal by simulating simple operations, copying models of invoices, of drafts to order, of cheques, &c., he should also exact that the calculations and the writing should be executed very neatly and elegantly, and in consequence, that before any model is copied, all the results should be verified.

Caligraphy. — Principles and practice, English handwriting, running-hand.

Drawing.—Continuation of linear drawing, and of drawing from models.

In the classes for linear drawing the notions of lines and surfaces, imparted in the course of the preceding year, should be recapitulated. Ordinary curves and conical curves should be drawn on the black board and explained. The exercises on paper should consist of mosaics, iron railings, balustrades, &c. Dull grey tints and black tints spread over the drawings should continue to be practised, as a preparation for the colouring of solid bodies.

The imitative drawing should comprise architectural ornaments, and the human face. When the pupils are to copy an ornament or a face, a model in relief, of the same size as the drawing they have to execute, should be placed in the room, in order that they may constantly carry their eyes from the board to the model, and from the model to the board, so as clearly to understand what they are about. The models of graphic exercises on paper are inclosed in frames under glass, placed in front of each pupil so as to oblige the latter to draw them without taking any measurements on the model, and merely in accordance with the dimensions indicated in the text relating to each drawing.

This branch of instruction is one of those in which the greatest latitude is left to the teacher, as the lessons ought to be given with reference to the particular industry of the province. The programmes of the course of drawing, and the choice of models, are therefore left to the decision of the members of the Council of Improvement, who alone can have a sound judgment on the matter.

Gymnastics.—Rhythmic movements, a little more sustained than the first series, and accompanied from time to time by a short and easy song, alternate movements with arms and legs accompanied by singing, jumping preceded by a run, jumping from a height not exceeding one metre thirty centimetres, exercises with dumb bells on horizontal ladders or on oscillating lathes (*perches oscillantes*), &c.

Singing.—Each lesson should open with exercises in solfaing. The master should sing out short musical phrases which the pupils should endeavour to reproduce. These phrases should never go beyond the extent of an octave. Towards the middle of the lesson the singing should be suspended for some minutes during which the principles should be explained.

The musical tone, scale of tones, degrees, intervals, gamut, octave, means of representing tones by signs, notes, compass, the C clef, intonation, duration, time, simple time, $\frac{2}{4}$, $\frac{3}{4}$, 4, breve, semi-breve, minim, equivalent rests.

The lesson should conclude with a song sung in unison, and two-part chorusses.

Second Year of Instruction.

French—first principles of style and composition	4 hours weekly.
Modern languages	4 „
History of France, and leading facts in modern history up to 1789	4 „
Geography of France, agricultural, industrial, commercial, and administrative	4 „
Mathematics—commercial arithmetic, conclusion of geometry	5 „
Physics—general properties, liquids, heat, electricity	2 „

Chemistry—metalloids and alkaline metals ..	2	hours weekly.
Natural history—zoology (birds, reptiles, fishes, insects), geology	2	,,
Accounts—exercises preparatory to book-keeping	1	,,
Caligraphy	1	,,
Drawing	5	,,
Gymnastics	1	,,
Singing	1	,,
Total number of lessons ..	32	,,

EXAMINATION PRELIMINARY TO ADVANCEMENT.—At the end of the first school year the pupils are subjected to an examination in all the subjects included in the courses which they have just finished, in order to prove that they are competent to take part in and profit by, those which are about to commence. The judgment of the examining professors, together with the reasons on which it is founded, is entered in minutes signed by them, and transmitted to the rector. The pupils are placed according to merit.

In making out this list the work of the whole year is taken into account; the list of the places held by each pupil during each week are consequently taken into consideration, and a triple value is even attributed to the number representing the places held during the year taken altogether, in comparison with that attached to the standing taken during the examination at the end of the course.

Those pupils who do not answer satisfactorily during the examination, are allowed to subject themselves to a new examination at the recommencement of the classes, but if they fail a second time they must, in their own interest as well as in that of the studies, recommence the course of the preceding year.

At the end of each year devoted to special instruction, similar examinations and similar classification of the pupils shall take place.

FRENCH.—*First principles of Style and Composition.*—However simple a subject may be there will always be a certain art in combining the various parts of which it is composed, so as to make it tell, and this art is useful to all, to the public orator or functionary, as well as to the simplest artisan. A common business letter ought to be clear, methodical, and accurate; in order to impart these three qualities to it, the writer must think over his subject, must place the different parts in suitable order, and must choose the expressions which most accurately convey his meaning. A regular course of rhetoric would, therefore, not be out of place towards the end of the complete programme of the special schools, but the age of the pupils will not allow of the dry rules of the syllogism and the forms under which it is disguised being explained to them, nor of the various figures of speech being described to them, which besides, nature herself teaches even to those men who are the least practised in the art of speaking. In the lessons to be given in style, the method indicated for teaching the grammatical rules should be followed; that is to say, the pupils should be made to read a great deal, and during these readings the principal rules of style and composition should be incidentally deducted, and during the greater part of the year the task imposed should be to reproduce the test which has been read and commented upon during the lesson. In this manner the pupils will be supplied with a fund of ideas necessary for speaking and for writing, and which they cannot as yet be expected to have

acquired for themselves, because such a fund is the result of experience, of observation, of memory, and of reflection.

The professor should explain, by means of numerous short examples, the qualities which every sentence in general should possess, lucidity, precision, and correctness. He should point out summarily the various kinds of style, and he should conclude with a study of narrative and of description, which should form the principal part of the instruction in this branch during this year.

Before reading the narrative meant to serve as a model, he should give an account of the subject, which the author has treated, and should in a few words analyse the facts which he has had to develop. This abstract should be successively repeated by several pupils, in order that the master may ascertain that the subject has been well understood; then he should read the narrative, interrupting himself from time to time, to point out the dominant idea, the accessory thoughts, the most remarkable expressions, and to show how much the writer has been able to make out of his subject.

The task should be the reproduction of the fragment thus studied.

Towards the end of the year the professor should give the pupils some short and amusing subjects of narrative or description to treat of, in order to afford them opportunities for developing the thoughts they have acquired through the previous exercises.

Modern Languages.—Continuation of the method prescribed for the preparatory course. The sentences dictated and written on the black board should be somewhat longer; short anecdotes, simply told, should be learnt by heart, and repeated aloud in the class in the language which the pupil is learning.

History of France, and Leading Events of Modern History, up to 1789.—The professor should begin with the infancy of France, and follow her history up to the present era, isolating it from the history of other nations, without, however, neglecting those great events which must of necessity lead the historian beyond the French frontier. He should give an account of the most noteworthy facts; should dwell upon the fine characters that appear, but should avoid details, which would uselessly fatigue the attention of the children.

The pupils should receive short summaries, drawn up with great care, and which, after having served the purpose of notes, should be learnt by heart, and recited, or still better, should be developed at the commencement of each lesson.

The task should be the reproduction of the lesson given by the master.

Geography of France, Agricultural, Industrial, Commercial, and Administrative.—The trader is the indispensable mediator between the consumer and the agricultural and manufacturing producer. Without him the agriculturist and the manufacturer would be obliged to limit their production to the wants of the local consumption; it is through means of the merchant that one may at all times and in all places procure the articles produced by the two other classes. Bound together by constant relations, commerce, industry, and agriculture, should be as little separated in the school as they are in practical life. The powers inherent in each of these manifestations of activity are increased and multiplied by their common action. At a period when commerce was hardly distinct from the sources which fed it, the small manufacturer retailed his own goods, and one might spend one's life in buying and selling certain determinate objects in a given place. In the present day, inventions, improvements, and the rapid means of transport

have changed the conditions of existence of the public markets. The former merchandize have been transformed, others have been created; every day new new things are being cultivated, and manufacturers are opening new outlets for themselves, which give rise to combinations unknown to ancient commerce, and which more than ever ensure success to those who are best informed, and have the most general instruction; hence the necessity for a course of commercial geography for the pupils of the special schools, who are one day to be merchants, or manufacturers, or agriculturists. The school cannot take the place of the usual apprenticeship, which can alone form practical workers; but it is useful to know before-hand the commercial geography of distant countries; to be acquainted with the products furnished by the mining, the manufacturing, and the agricultural industry of the principal regions; the places of origin, and the importance of the raw materials which are most largely consumed; the products consumed and manufactured by the principal cities and countries; the means of communication, the weights, measures, and coinage in use; the mode of sale; commercial usage relative to the merchandize of wholesale trade; in a word, the information required by every merchant who wishes to be instructed as to the transactions and the wants in the principal quarters of the commercial world.

The study of the physical geography of France should be taken up again, because every man ought first of all to be acquainted with the territorial riches of his own country, and more particularly of his own department, on which the teacher ought to dwell; because also of their offering familiar examples, easy to understand; the following year the relations of France with other countries should be studied. The professor should describe the principal agricultural regions, and point out their climatic conditions; he should speak of the different kinds of cultivation, of natural and artificial meadows, of vineyards, forests, the rearing of domestic animals, &c.; he should describe mining industry, point out the localities in which the raw materials, such as coal, iron ore, &c., are fund, and where great mechanical and chemical industries have been developed, &c.; finally, he should indicate the navigable routes, the railways and roads, and conclude with a table of exports and imports, to which he should add a statement of the population; lastly, he should enumerate the countries with which France entertains the most active commercial intercourse, and devote a few lessons to our colonies, showing their relations with the mother country.

MATHEMATICS.—*Commercial Arithmetic.*—Recapitulation of the rules of calculation of fractions, and the properties of proportions; practical rule for the extraction of the square; rule of three; of society and of simple interest, already learnt by the method of reduction; explication of the rules of discount, of composition, of allegation, of compound interest and of annuities; numerical exercises relative to public *rentes* and loans; details concerning the sinking fund (*caisse d'amortissement*), and the Bank of France; show that by means of letters and conventional signs calculations may be abridged, and operations generalised; give a foreshadowing of algebra by writing down in letters the results obtained.

The task should be numerous exercises in answering common questions.

Solid Geometry.—The professor should take care that the course retain its character of practical usefulness; he should therefore not proceed in strictly scientific order, nor demonstrate theorems independently of their application; he should, on the contrary conduct the

whole course of the instruction, so as to elucidate constantly by application. When arrived at solid geometry, he should make use of small plates of cork, of 25 to 30 centimetres in length and breadth, to represent the planes, and of wooden sticks with points to represent the lines; with these plates and these sticks he should construct the figures, the properties of which he is going to explain; then, having presented it to the pupils from different points of view, he should draw it on the board, and during the course of his demonstration he should successively pass from the figure to the diagram, and from the diagram to the figure.

Each pupil being furnished with a similar apparatus, but on a smaller scale, should himself reprodnce the proposed figure. In this way the course of this year prepares the pupils for the lessons of descriptive geometry.

Of the Plane.—From the perpendicular to the plane. No more than one perpendicular can be drawn through a given point on to a plane; to draw a perpendicular line from a given point to a plane without the aid of the T square, &c.; two lines perpendicular to the same plane are parallel; horizontal plane; planes mutually parallel, &c.; of the angle of two planes; trace a line of the greatest inclination on an inclined plane, &c.

Cylindrical Surfaces.—Production of cylindrical surfaces; straight, complete, truncated cylinder; to trace a straight and complete cylindrical surface, the length and the radius of which are given; production of a cylindrical surface; to draw a straight and truncated cylindrical surface, of which the radius is known.

Conic Surfaces.—Straight conic surfaces may be produced (*engendrée*) by the revolution of triangles, rectangular bodies, &c.; to draw a straight and complete conic surface; application to the arts. Developable surfaces: left hand surfaces; examples, wings of a mill, the moldboard of a plough, winding stairs, &c. Spherical surfaces: production of the spherical surface; to draw a spherical surface, the radius of which is given.

The Prism.—Straight, oblique, complete, truncated prisms; to draw a straight and complete prism, an oblique prism; principal propositions as to prisms; the cube; the pyramid; regular polyhedrons; the sphere.

Measurements.—To measure the lateral surface of a prism, a cylinder, a pyramid, of the trunk of a straight cone (*tronc de cône droit*), of a truncated pyramid, &c. To measure the surface of a spherical concave (*calotte*), of a zone, of a sphere, &c. To measure the volume of a prism, of a cylinder, of a parallelepidon, of a cube, &c., of the sphere, &c., &c.

The professor should have at command a collection of solids, in wood or pasteboard, or made of glass-plates, pasted together at the edges, and which allow the angles to be seen, and he should constantly make use of these to render comprehensible his propositions as to volumes, truncation, and conic sections. In the same way as he realised the solid figures of geometry, and exhibited them to the pupils before drawing them on the board and explaining their various properties; he should exhibit the volumes in wood, and allow them to pass through the hands of all the pupils, before drawing on the board the body of which he is going to treat.

PHYSICS.—*General properties of liquid bodies, heat, dynamic electricity.* —During this year's course the teaching should still remain simple, because it is addressed to children; algebraic formulas should be left aside, as they can almost always be advantageously replaced by nume-

rical examples; the principles will therefore be not so much demonstrated by theoretical considerations, as they will be made comprehensible by experience.

Apparatus for measurement. Vernier. Dividing machine. Compressibility and elasticity of bodies. Saturation (*trempe*). Balance. Method of double weights. Exercise the pupils in exact weighing. Properties of liquids. The principle of archimides. Pascal's hydraulic press. Areometers. The barometer. The pneumatic machine. Mariotte's law. Syphons. Aerostats, &c.

The second part of the course should comprise heat and its applications. Refrigerating mixtures. Latent heat, heating of baths and of rooms. Hygrometry. Mists. Clouds. Rain. Snow. Winds. Dew.

The course should conclude with dynamic electricity, the electric pile, magnets, and electric telegraphs.

CHEMISTRY.—*The Metalloids and the Alkaline Metals.*—The lessons of this year should bear upon the principles of chemistry, and the professor should base all his reasonings on experiments. He should make the pupils acquainted with the composition of bodies as regards the nature of their elements, by means of distinct reactions; he should give the centesimal composition of essential bodies in round numbers, without insisting on quantitative analysis, except as regards air, water, carbonic acid, marine salts, chalk, plaster of Paris, and some other equally common composites, which should be taken as examples. This course should commence with the study of metalloids and their most important applications in manufactures, &c. Next, metals in general and the most common alloys should be examined; lastly, the salts in general, and the carbonates, the sulphates, and the azotates in particular, should be the objects of attention. The course should terminate with the study of the alkaline metals, to which should be added some details relating to the calcareous substances, limestones, mortars, plasters, and ammoniacal salts.

NATURAL HISTORY.—The professor should continue to give an elementary and practical character to the lessons.

In zoology, after having recapitulated the general characteristics of the vertebrate animals, he should pass on to the study of birds; their conformation is in accordance with their mode of life; the instincts of family and of race are manifested in the construction of their nests, in the bringing up of their young, and in their migrations in search of milder climates. The history of reptiles will furnish the professor with opportunities for useful hints as to the distinctive characteristics of the venomous and the non-venomous serpents. With the history of fishes and their mode of organization, should be combined the study of the resources which they offer as means of alimentation. The history of insects should serve as a basis for interesting lessons on the instinct of bees, or the metamorphoses and the products of silk-worms. Then, after having imparted some notions as to molluscs, the snail and the oyster; as to zoophytes; sponges, &c.; and as to infusoria; the eels of paste and of vinegar; as to monads, &c., the professor should recapitulate the principal characteristics of the most important branches, classes and families.

BOTANY.—Vegetable physiology, or the life of plants, should be the subject of the lessons of this year. Germination, the part played by the root, by the leaves, by the stem; the influence of light on the green and on the other coloured parts; the composition of the sap, and the part which it plays; the formation of the cells, the fibres, and the vessels, of the tissues composed of the elementary organs, of starch,

sugar, oils, and resinous juices; further, the relations which exist between the plants and the air, the soil and the waters of the earth, should also be dwelt upon, and will afford numerous opportunities for direct applications, full of interest.

The lessons in geology should be devoted to the study of the complete series of strata, passing rapidly over those formations which are of no importance from an industrial point of view, or which are not found in any considerable extent in France; but the slate and coal formations should be dwelt upon, so also the brown freestone of the Vosges, the saliferous rocks, the chalk formations of the Jura; the tertiary basins, and, above all, the formations immediately surrounding the locality in which the school is situated.

ACCOUNTS.—*Course Preparatory to Bookkeeping.*—The pupils are acquainted with the vocabulary, and know how to make out the various accounts which serve to verify the first operations, the master may therefore now turn his attention to the books usually kept in connection with commercial dealings, prove the necessity of them, and explain the plan on which they are generally kept.

He should first mention the three obligatory books, quoting the article of the code which prescribes the use of them, then the most usual auxiliary books; he should explain the note of discount and of back exchange, and the account of redraft; he should accustom the pupils to make out such accounts themselves by setting them numerous exercises. He should next occupy himself with current accounts, bearing interest, and with the three methods, viz., the direct, the indirect, and the Hamburgh method. Lastly, he should teach the pupils how to keep the day-book, the object and utility of which he should explain, giving a detailed account of the arrangement and of the specification of the articles.

The pupils cannot be too much practised in entering into the day-book the items of sales, purchases, discount, &c., for these exercises will make them understand the operations, and will directly prepare them for keeping the journal with which they will have to occupy themselves the following year.

This course completes the preliminary knowledge which the pupils require in order to be able to understand bookkeeping, properly so called, which will be taught to them during the course of the ensuing year.

CALIGRAPHY.—End of the lessons: round hand, Italian hand, models of capitals, &c., applications of divers kinds of handwriting.

DRAWING.—Continuation of ornamental and linear drawing, according to the method adopted the previous year.

Ornamental drawing. Copying figures and ornaments. Commencement of hatching to represent relief. The model from which the drawings are to be made should always be placed in the class-room.

Linear drawing: principles of the methods of projection for the representation of lines, surfaces, and solids. Representation of the relief of bodies by means of simple lines and washing in colours. Details of the practice of washing. Elementary notions of architecture, and distinctive characteristics of the principal orders.

Before commencing each architectural drawing, the pupil should make a sketch of the plan to be executed, in a separate copybook, and should carefully note down the dimensions (*les cotes*). These sketches should be done in pencil, or in ink, without the help of rule or compass, and should serve for constructing the plan.

Some suitable planks should be selected to exercise the pupils in

using the ruler, and the use of conventional tints should be explained to them.

GYMNASTICS.—Marching and running, regulated by singing; exercises on the rope ladder, on the oscillating plank, on the smoothe rope, on the pole, under the horizontal ladder, on the parallel bars, &c.; jumping from height of not more than one metre thirty centimetres; exercises on the horse, on the inclined ladder, on the horizontal pole, on the arm-swing, and on the horizontal bar.

SINGING.—Continuation of the explanation of the principles.

Study of the chromatic scale; modified tones; accidents.

Second study of the diatonic scale.

On the intervals of tones; study of the tetrachords; major and minor keys; typical scale of do and of la.

Construction of scales similar to this typical one, on the first sound of the superior tetrachord, or on the fourth tone of the inferior tetrachord; position of the sharps.

Position of the flats.

Study of the key fa.

Pinary and ternary groups.

With the lessons in theory should always be combined practice, intonation, dictation, and singing in unison should terminate each lesson.

THIRD YEAR OF INSTRUCTION.

Ethics	1	hour	weekly.
Course of literary composition	2	„	„
History of French literature	1	„	„
Modern languages	4	„	„
Commercial geography.—France considered in its relations with foreign countries—history of France, and general history since 1789	3	„	„
Principles of civil legislation	1	„	„
Mathematics—principles of algebra—descriptive geometry	4	„	„
Mechanics (principles)	2	„	„
Cosmography	1	„	„
Physics (heat, acoustics, light)	2	„	„
Chemistry (metals, notions of organic chemistry)	2	„	„
Natural history—zoology (the principal physiological phenomena)—botany—geology	2	„	„
Accounts—bookkeeping properly so called	1	„	„
Drawing	6	„	„
Gymnastics	1	„	„
Singing	1	„	„
In all	34	„	„

Information derived from the various parts of the empire shows that a certain number of pupils usually leave the special colleges at the end of the third year. The same takes place in Belgium, and took place in Germany and Switzerland during the first years after the introduction of practical or special schools. But this much-to-be-regretted habit will gradually disappear in France, as it has disappeared

on the other side of the Rhine, and in Switzerland, as soon as this system of construction, having been regularly organized, and having become more known and appreciated, shall have taken the place which is secured to it by the services it will render, and by the guarantees which the diplomas, given to the pupils in its name, will hold out to parents and to the public in general.

The third and fourth years' courses of the special schools will not lack pupils. The more advanced age, and the greater maturity of the latter, call for a greater breadth of instruction.

Ethics *.—The third year constitutes as it were the course of rhetoric of the system of special instruction. Indeed the course even partakes of the character of the philosophical course in the lycées, inasmuch as, although it is not proposed to teach methodically psychology and logic (which to be well understood require deeper and longer literary studies), the pupils are made practically acquainted with the essential and necessary features of these two sciences; they are taught ethics, which are accessible to all degrees of intelligence, and for which the catechism and the religious instruction, have prepared the way. The object of the course of private and social ethics is to give the pupils a rational conception of the duties which we all have to perform.

The apprenticeship to these duties, which begins for man with the first dawn of reason, is prolonged during the whole period of education, and indeed during the whole of life. Every master, who has a sense of his true mission, devotes much care to developing in the mind of his pupils the moral sense, and the love of goodness. But these notions of duty which are, so to say, acquired from day to day, need to be co-ordinated and presented in their entirety, supported by the motives which justify and confirm them, which render them immovable, and make them one of the best guides of conscience. Such is the object of this new branch of instruction, which crowns and completes the lessons of the special school.

Industry has been accused of developing to excess the taste for material well-being, and of turning the thoughts exclusively towards the acquisition of that well-being. Our pupils being constantly recalled to the sense of their moral obligations towards themselves, towards society, and towards God, will be preserved from this danger.

This course should be less a series of philosophical lessons, than a course of morals in action explained by science, the professor endeavouring to make the precepts understood by examples, in the beautiful manner followed by Cicero in his treatise "On Duty." The object of the teacher should be to strenthen as much as possible in the hearts of the children by his lessons, and by his example, self-respect, filial piety, love of their country, and obedience to its laws. The university cannot forget that ethics cannot be taught like an exact science, and that the lessons of the master, if they are to penetrate the hearts of the pupils, must be supported by the authority of his own life.

The object held in view during the course of the third year, is to develop the headings in the programme which treat of the duties of man towards himself, towards his fellows, and towards God.

Literary Composition.—The principles of style and composition

* In the distribution of time allotted to each lesson, one hour has been marked in the programmes as given to ethics, instead of one hour and a-half, which will be required, but which will be an exception to the usual duration of each lesson. The administration of the lycées and colleges should however take care that the necessary time be allowed for this subject.

explained in the course of the preceding year, should be briefly recapitulated while reading again some of the fragments then read.

As regards the course of this third year, it should be devoted to literary exercises, such as narratives, letters, reports, dissertations; the narratives and the reports in order to teach the pupils to examine the various circumstances of a fact, to distinguish the succession of these, take in the *ensemble*, and to co-ordinate the details, in order to present the narrative in a clear and interesting manner, and with an appearance of verisimilitude; letters, because business matters demand a particular epistolary style; dissertations, that should be short and simple developments of moral truths, of some grand phenomena of natural history, which manifest to us the beauties of the plan of creation, and lastly of some event in history, which may give rise to serious reflections. During the last months of this year some notion should be given to the pupils of the art of arranging their ideas in proper order, and of expressing themselves with clearness, simplicity, and elegance.

A class-book of extracts from the best authors, to serve as models, and guides should be placed in the hands of the pupils. Each day an extract should be read by one of the pupils, then, the book being closed, the reader should endeavour to reproduce what he has just read, while his schoolfellows take notes for the purpose of completing his exposition, contradicting it, or correcting it as regards either form or substance.

This method teaches the pupils to speak, to reason and to discuss, faculties which it is of importance to develop in young people, who are at an early age to mix in business.

History of the Literature of France.—The professor should give a sketch of the literary history of France, connecting with it some of the most illustrious names in the literature of other countries, he should read extracts from Joinville, Froissart and Commines, Montaigne and Malherbe, in order to reach Corneille, Molière, Racine, la Fontaine, Boileau, Descartes, Pascal, &c., whose works, together with those of some carefully selected authors of the present day, should form the real subject of his lessons.

He should commence each lesson with a biographical notice intended to make known to the pupils the author whom he is about to dwell upon, and to enable them to understand the allusions to the events of the author's life which are constantly being made in the writings of others, and in conversation. The master should then analyse the principal works of the author, should point out the method of composition followed by him, the leading and the accessory ideas, the arguments, and the passion, if there be question of a speech; the characters and the plot, if there be question of a comedy or a tragedy; and lastly, he should indicate the order in which the author has developed his subject.

Part of the time should be employed by the pupils in reading aloud passages from the author whose writings have been analysed. This reading, which is intended to make the hearers feel more thoroughly the beauties of the style and of the details, should be interspersed with questions which should afford an opportunity to the professor of completing the literary knowledge of the pupils, and of giving them an idea of the various kinds of composition which were not touched upon in the course of the preceding year.

As an exercise that should be repeated very frequently, the following is recommended: the professor having prepared a short and easy subject, and a very distinct summary, should indicate the most prominent ideas, and the order in which they should be placed. He should

then desire one of the pupils to develop them aloud; his fellow-pupils, after having listened to him, should be at liberty to contradict him, and the master, in his turn, should then criticise the main features, as well as the form of the discourse. It is at first very difficult for the pupils to conform to this exercise; but as soon as they have got a little into the habit of it, they give themselves up to it with much pleasure, and it is very useful to them.

Their task should be to make a critical analysis of the literary extract read and commented upon at the beginning of the lesson.

MODERN LANGUAGES.—Continuation of the course, according to the same method followed during the preceding years.

As tasks, short, simple, and easy themes, to be written in the foreign language which the pupils are studying.

HISTORY OF FRANCE, AND GENERAL HISTORY SINCE 1789.—In proportion to his education ought to be the knowledge of each man of the history of his country. Every Frenchman ought to be acquainted with, and to retain in his memory, the great things which have been accomplished by the monarchs, the clergy, the nobility, and the people, from the beginning of the monarchy down to 1789, and should know what part his forefathers took in the transformation of the ancient state of society, and the establishment of the new. It is especially important that the pupils of the special schools, who are to form the most intelligent part of the people, among those classes who devote themselves to ordinary arts of life, should be well acquainted with the progress made in modern times, in order that they may be preserved from that disdain of the present, and from that fatal striving towards the future, which prevents a man from forming a healthy appreciation of the times in which he lives, and from being an intelligent and useful member of society. The pupils should, therefore, study contemporary history during this year's course, in order that those among them who are unable to complete their studies may leave the school with some knowledge of what has taken place in France and in Europe. The course comprises the history of France, and general history from 1789 to the present day. Its object is to develop sincere patriotism, generous love of their country, and of the monarch who represents it, and an elevated and profound sentiment of the greatness of France, and of the dignity of the French name.

This year, like the preceding one, the pupils should be furnished with summaries to aid their memories.

As tasks, should be given themes on the matters which have formed the subject of the lesson.

COMMERCIAL GEOGRAPHY.—*France considered in her relations with other Countries.*—In the courses of the preceding years the pupils have studied France in detail; they have learnt to know the riches of her soil and the products of her manufactures, as also the facilities offered for her internal commerce. These notions constitute the essential part of their instruction in special geography; this is a knowledge in which none ought to be wanting, not even those whom the necessities of life oblige to leave college at the end of the second year. But there is a further knowledge of this subject, the importance of which increases in proportion as the relations between nations are multiplied: this is the commercial geography of the world in general. It is indispensable for the merchant, and to persons following industrial pursuits it affords many precious hints. In England the manufacturers are as well acquainted with the condition of the most distant markets, as with the state of the London market; their numerous relations with foreign

countries facilitate the acquisition of this knowledge, and the knowledge in its turn increases their connexions.

In this branch of instruction France must always be the starting point and the centre. It is in these relations with our country that foreign countries should more particularly be considered. Their manufactures and their internal means of communication should not, therefore, be studied in detail, but those points should be examined which are, or which may be, brought into connection with French commerce. The nature of this commerce should be indicated, likewise the amount to which it is participated in by the principal states, and the mode of exchange. The raw products and the most common manufactures of these countries should also be described.

The lessons should begin with the countries in Europe in closest proximity to our frontiers, and these should be studied according to their precedence in point of importance.

PRINCIPLES OF CIVIL LEGISLATION.—It would be superfluous to prove that the pupils of the special colleges require to have some idea of civil rights; but it will be as well to point out in a few words what matters the instruction in this branch should touch upon.

The course should be divided into two parts, because the rules of common law, which concern all citizens, should not be confounded with those regulations which are restricted to certain classes, the laws to which the non-commercial classes are subjected, with those which touch the commercial classes only.

The professor who has to teach common law (*législation usuelle*) should not forget that he is addressing young people about to enter into active life in presence of the laws of their country, and to whom it is of importance to be initiated into the duties which these laws impose, in order that they may the better be able to exercise the rights which the laws guarantee to them. The formalities to be observed in the different situations in which each person may find himself placed should, therefore, be dwelt on rather than theories and doctrines. Above all, the following questions should be answered: "What ought to be done under such and such circumstances? What formalities ought to be observed? What would be the consequences of forgetting them, or of voluntarily disregarding them?" The professor should, therefore, indicate the acts which persons may or ought to perform themselves, and the forms that should be used on different occasions, and he should point out the dangers that would be incurred by the non-observance of the prescribed rules. The order of the subjects to be treated is traced beforehand; how laws are made, how they are promulgated, what respect is due to them. A summary sketch should then be given of the administrative and judiciary organization of the empire. He should touch upon the civil rights of persons, of domicile, on marriage, on paternity and on filiation, on the state of minority, on guardianship, on interdiction, on the distinction of possessions, and on the dismemberments of property. The articles from the Code Napoleon should be given, which are frequently applied in the ordinary course of life. Notions should be imparted of obligations, inheritance, donations, and wills. The contract of marriage and its various stipulations, sales, limitations, leases, civil societies, loans on interest, public funds, insurances, standing security, imprisonment for debt, hypothecation, prescription—all these should be explained. The course should terminate with some lessons on civil procedure, the stamp duties, and the registration tax, the penal law, and the institution of the jury.

MATHEMATICS.—*Elements of Algebra.*—The professor should com-

mence the course with a recapitulation of the rules of interest, of discount, of society, and opposite the final result obtained and expressed in figures he should in each case place the letters representing the same result. The pupils thus become insensibly familiarised with the use of algebra, and without its being necessary, so to say, to explain to them that this science is but an abstract means of generalisation. Continuing this system, the professor should make them execute sums of addition and subtraction with letters, in order to accustom them to the use of these, but without entering into a detailed explanation of ordinary definitions; not until after a certain number of exercises, and when the pupils are already familiarized with the new symbols, should he explain by degrees what is understood by formulas, terms, monomes, polynomials, exponents, and co-efficients; multiplication, regular polynomials (*polynomes ordonnés*), division, fractions, proportions, inequalities, equations of the first degree, with one and several unknown quantities.

As tasks, should be given numerous exercises in algebraical calculation, and problems of easy solution.

The first notions on the equations of the second degree with one unknown quantity, should be the limit of the instruction in this course.

Descriptive Geometry.—Many pupils find it difficult to represent to themselves the geometric figures in space, to read in space, as it is called; nevertheless, to read in space is an indispensable faculty for artisans and other persons following industrial pursuits, and every effort must be made to develop it in the pupils of the special schools. The teachers of descriptive geometry should, therefore, make use of the planes with turning joints, and the stems furnished with points which are used in the *Conservatoire des Arts et Métiers*, in order to represent straight lines and planes, and to render palpable their various respective positions. The pupils being provided with similar apparatus, but on a smaller scale, should themselves realize the figures proposed; when all the pupils have finished their constructions, the professor should exhibit his from every point of view, in order to accustom the eyes of the pupils to the different aspects under which it may appear; finally, suppressing lines and planes, he should draw on the board the material figure which he has just constructed, after having assured himself that all the pupils have read correctly in space, and have understood the relations of the lines and the planes. The instruction given in this way is slower, but it keeps alive the attention of the young people. The method is, besides, indispensable for many of them; the success of the pupils in the study of projections, perspective, and cosmography, and as regards the works which they will one day have to undertake, depends entirely on their perfect understanding of this first part of the course, which is, as it were, the alphabet of a more complex kind of reading.

It is well known that the data of a practical geometrical question are essentially numerical, thus a point is given by the distances of the two planes of projection, measured and expressed in metres and centimetres, a straight line by two of its numbered points, and frequently by a point and the angles which the straight line makes with the planes of projection, &c. The pupils should, therefore, be early exercised in constructing on some given scale the data of the question proposed, the amplifications, the reductions, the changes of scale, ought to be rendered familiar to them by numerous examples. Every problem in the theory has its correspondent in numerical data, and all the plans are executed

on a given scale. Furthermore, as the instruction is addressed to young people, who as yet are little accustomed to abstract considerations, their eyes ought to be constantly appealed to in aid of their understanding; the professor should, therefore, propose numerous examples in support of the principles propounded, and the objects in relief should be placed before the pupils. The representation of bodies should be much dwelt upon; the proposed exercises are in the first place useful in themselves, because they give to the pupils their first notions of frame-work (*charpente*), but the exercises are more especially beneficial by giving the pupils the habit of reading the language of projections, and of figuring to themselves objects in space. Lastly, every opportunity should be seized for representing simple applications to stone-cutting and the determination of shadows.

Representation of a point and a straight line to trace the projection of a cube, a prism, a pyramid, some simple joinings of timber work, such as joining with mortise and tenons, &c., projections of a pair of principals, representation of a plane, straight lines (*droites*), and perpendicular planes, method of rabbetting (*rabattements*), angle of two straights, angles of two planes, rotatory movement round a vertical axe, applications, intersections of a sphere and a plane, curve of contact of a sphere with a circumscribed cylinder, &c.

MECHANICS.—The science of mechanics is the one of which it is most important to diffuse the true principles and the fixed data through the middle classes, the children of which will fill the special schools. This science, indeed, governs the whole industry of man, as even the slightest labour necessitates an expenditure of force. It substitutes for his skill and his intelligence the physical strength of animals, or the powers of nature, which afford unity of labour at a lower price. It gives exact rules which enable those who know them to avoid unnecessary expenditure, either by modifying the motors according to necessity, or by turning a given force to the best possible advantage by means of well-contrived transformations of movement. Lastly, it emancipates the mind from injurious prejudices and illusions, for which it substitutes firm and fertile principles, which may be of daily use; it prevents mere fumbling in the dark, mistakes, miscalculations, losses of time, and money. To endeavour to popularize the fundamental truths of mechanics is, therefore, to labour for the future prosperity of France. In consequence special instruction includes the mechanical propositions which are necessary to furnish such notions of elementary mechanics, which every one requires to know in the ordinary course of life, and which will enable the scholars to understand, and to take an interest in, the progress made in the science of machinery.

After having given some preliminary ideas of motion and forces, of centres of gravity, and conditions of equilibrium in heavy bodies, the professor should treat of the various kinds of movement. Afterwards he should dwell upon the industrial measure of mechanical work, and of its transmission in machines in motion, and on this occasion he should carefully demonstrate that what is gained in force is lost in the distance travelled over. These principles having been expounded, the professor should next enumerate and describe successively the principal organs suitable for transmitting and transforming motion in machines; he should touch upon the resistances with which the action of forces meet, and should conclude with a special study of steam-engines, as an application of the mechanical laws which he has demonstrated.

Taken altogether, these, the simplest and most indispensable notions, will form a fund of ordinary knowledge which will suffice for the greater

number of the pupils of the special schools, but which will, nevertheless, be completed during the course of the following year.

Cosmography.—No one in the present day ought to be allowed to be entirely ignorant of the laws which govern the movements of the stars, the return of the seasons, the phases of the moon, the periodical reappearance of comets, the manifestation of eclipses, and the movements of the tides. In 1852 the Imperial Council prescribed for all the schools connected with the University a course of cosmography, that is to say, of purely descriptive astronomy. A motive of a different kind justifies the place accorded to the elements of this science in the new programmes. Man does not live alone the life of the body, he requires also the life of thought, therefore in every system of education there should be an admixture of a literary and moral element, as a corrective to those studies which exclusively concern material life. The very nature of special instruction, which rests essentially on scientific considerations, demands that to the linguistical and historical studies there should be added that of a science the most calculated to elevate the soul, and to expand the mind. First impressions are the most lasting, and if we open up to the child the simplest pages of the stupendous book in which man alone, of all the beings known to him, has the happiness of reading, the youth will find later in life, deep in the recesses of his heart, the remembrance of the lessons which he has received. Astronomy is the model of the sciences of observation, it teaches us better than any other to correct the illusions of the senses, by manifesting the truth when deceptive appearances have seemed strangely to give the lie to science. But the study of astronomy will not have this effect unless the professor bear constantly in mind the age of his young auditors, and the object which they pursue in life, and unless he bring down the truths of astronomy to the level of their understandings and of their knowledge.

The most striking astronomical phenomenon is the rising and the setting of the sun, and of the moon, &c., in general the diurnal movement of the heavens, which leads to the recognition of the spherical form of the earth, and of its rotation on itself; and this should be the starting point of the instruction given.

The professor should avail himself of every occasion to show in the sublime harmony of the heavens, a striking manifestation of the Almighty Being whose word has created, and whose Providence upholds the infinite marvels sown throughout the universe.

Physics.—*Acoustics and Light.*—After a rapid recapitulation of heat and electrodynamics, should follow lessons on acoustics. The generation, the propagation, and the numerical relations of sounds form the mathematical part of this science, which the theories of Sauveur, Chladni, and Savart have rendered one of the most useful and most interesting. But the professor should keep in mind that algebraic formulas should be eschewed, and that the lessons in the physical sciences should be purely experimental. From this point of view he should treat of the conditions necessary for the propagation of sound, of the rapidity with which it passes through gases, liquids, and solid bodies. The reflexion of sound will furnish an occasion of speaking of acoustic chambers, and of the qualities which ought to prevail in a room destined for public meetings, concerts, &c. Some lessons should be devoted to the vibrations of chords, to musical intervals, to harmonious sounds, and to the principal accords which are formed by the notes of the gamut. Finally, he should touch upon some of the details connected with the principal stringed instruments, such as the violin, the harp, &c.

Whatever may be the nature of light, its undulatory motion acts upon the organ of sight, in like manner as the vibrations of the air act upon the organ of hearing. The teacher should therefore pass insensibly from the study of acoustics to that of light, which will terminate in a worthy manner the course of physics. Propagation, reflexion, and refraction of light; luminous spectrum, rays of the spectrum; phosphorescence; plane, concave, and convex mirrors, lenses, the eye, vision, telescopes, spectacles.

During this second part of the course, as during the first, the explanations of the professor should always be either preceded or followed by experiments.

CHEMISTRY.—*Metals.—Organic Chemistry.*—Iron, zinc, tin; oxides which they generate; characteristics of their salts; copper, lead, mercury, their oxides, and the characteristics of their salts; platina, silver, gold, &c. Most common alloys; daguerreotype; photography; silicum and silicates; clays, haslin, pottery, and glass.

Notions of *organic chemistry.* Characteristics of the organic acids in most common use; oxalic, acetic, lactic, tartaric, and tannic acid; summary study of woods; their deterioration and their preservation; starch, fermentation, alcohol, oils, textile fabrics, and their coloration; preservation of animal substances, &c.

The professor will be obliged during the last year's course of general chemistry, to make a selection from among substances which are far too numerous to allow of his touching upon them all. He should therefore direct his instruction with a view to a course of applied chemistry, and he should choose in preference as subjects of his lessons such as correspond to the industry of the locality which he inhabits. He should, before commencing his lessons, consult the manufacturers, who are members of the *Conseil de Perfectionnement*, in order to inform himself as to the nature of the local wants, and should compose his programme according to the data communicated.

NATURAL HISTORY.—*Zoology.*—At the commencement of the course, the most curious types were examined individually; afterwards the common characteristics, or the differences between two, three, or more of these were pointed out, and the idea of classifications, and the feeling of the utility of these was thus gradually awakened in the minds of the pupils; the field of observation has been extended, and the judgment formed and strengthened by constant practise in making comparisons. The professor may now, therefore, begin the study of the principal physiological phenomena, the knowledge of which is necessary for the completion of the natural history of animals; the relations which exist between living beings and the atmosphere; the organs of respiration; the physiological uses of the blood; the heart and its functions; food, and the process of digestion; absorption and secretion; the organs of motion, sensibility, &c. The course should conclude with a general survey of the principal differences which separate the diverse classes of animals from each other.

Botany.—Classification of plants. Natural methods. Linnée's system. Study of common plants. The principal natural groups which comprise, either plants generally cultivated in Europe, or species, the products of which being brought hither by commerce, and which play an important part in industry, should be passed in review. The origin of these plants should be indicated, the methods of culture suitable to them should be made known, and the uses to which they are put should be dwelt upon. The physiological conditions which limit the geographical zones, which determine the methods of culture, and which influence the

uses of the plants under consideration, should likewise be pointed out. The course of this year should be devoted to the dicotyledons exclusively.

In *geology* the existing volcanoes, their products, and their mode of action, the phenomena which environ them, the solfataras, should be examined; thermal springs and artesian wells show the increase of temperature in the soil, and lead to the idea of the central heat of the globe, of which volcanoes are the most powerful manifestation. Extinct volcanoes in Auvergne. Products of volcanoes, lava, basalt, trachytes, &c. Porphyric masses. Crystalline rocks, which differ most from the rock formations of the present epoch. Hints relative to the principal beds of metals, to metallic veins, to the mode of their formation, and to the determination of their age.

ACCOUNTS.—*Bookkeeping.*—The pupils having by this time learnt the vocabulary, and knowing how to distinguish active values from passive values, how to keep the auxiliary books, and how to make out the various accounts which serve to prove the operations, the professor should now commence bookkeeping.

He should establish the difference which exists between bookkeeping and commercial accounts (*la comptabilité*), strictly so called, the study of which is reserved for the fourth year's course, and he should begin with stating the method of double entry, showing that single entry and the mixed method are insufficient and incomplete systems, which afford no means of control.

Principles of bookkeeping:—Three categories of accounts. Definition of the journal, and manner of analysing the items. Explanation of the ledger; utility of its index (*repertoire*); posting from the journal to the ledger; the inventory; balance of verification; inventory of accounts; problems of bookkeeping, &c., &c.

The programme of this branch of instruction should be so made out, that every pupil who possesses the practical knowledge imparted during the three preceding years, should after this course be a good bookkeeper, so that if circumstances should oblige him to interrupt, or to cease entirely, his studies, he should be capable of making himself useful in business in this way, and of making an honourable livelihood by it.

DRAWING.—Figures from the round, and from nature. Animals and flowers from the round. Drawing from memory. Plants copied from nature.

The pupils should also be exercised in making free-hand sketches from various objects, such as physical instruments, geometrical models in relief, or very simple machines. The sketches, which should be numbered, should serve as basis of an exact representation of the objects, according to some fixed scale. The pupils are in this way rendered capable of designing tools, &c. The diagrams (*épures*) of descriptive geometry should likewise be executed, first with free-hand, in a memorandum book, and afterwards verified and drawn exactly on drawing paper.

The pupils should also be made to draw some designs in connexion with elementary mechanics, according to the lessons of the Professor of Mathematics, and in order to render the demonstration of the transformation of movements more evident, models of elements of machines, of the same size as the drawings, should be placed in the class-room.

GYMNASTICS.—The same exercises as recommended the preceding year should be continued without any augmentation of duration; the leaps from heights should also be continued, without any increase in the

height; continue the exercises with dumb-bells, on the horizontal ladder, on the oscillating plank, on the rope ladder, on the smooth rope, on the inclined ladder, &c. Commencement of vaulting on to a stuffed horse, taking leap from behind, &c.

SINGING.—*Principles (continuation).*—Modulation; what is understood by modulating; origin of the accidentals determined by modulations; passing, or durable modulations; how to distinguish between them; importance of this distinction as regards solfaing; of the seven kinds of voices; of the keys assigned to them; of the quality (*timbre*) of the voice; the enharmonic system; numerous examples borrowed from the great masters; movement; time; analysis of melody; what is meant by a musical phrase; by a period; simple and ornate melody; transposition.

FOURTH YEAR OF INSTRUCTION.

Ethics (public morality)	1	weekly hours
Exercises in literary composition, suited to special instruction	2	,, ,,
Modern languages	4	,, ,,
Elementary history of industrial inventions	1	,, ,,
Recapitulation of general history and internal history of France from the accession of Louis XIV to the present day.. ..	1	,, ,,
Commercial and industrial legislation ..	1	,, ,,
Rural, industrial, and commercial economy	1	,, ,,
Mathematics. Conclusion of algebra, common formulas of trigonometry, use of tables, logarithms, common curves, complement of descriptive geometry	5	,, ,,
Mechanics (recapitulation and conclusion; applications to the local industry) ..	2	,, ,,
Physics (recapitulation and development of the most important points)	2	,, ,,
Chemistry applied to the industry of the locality	3	,, ,,
Natural history applied to agriculture, to industry, and to hygienics	2	,, ,,
Accounts. Exchange, finances, and the *cour des comptes*	1	,, ,,
Drawing	6	,, ,,
Gymnastics	1	,, ,,
Singing	1	,, ,,
In all	34	,, ,,

PUBLIC MORALITY.—Conclusion of the course; statement of the duties of man to his fellows, and of nations to one another.

LITERATURE.—*Exercises in Literary Composition, suitable to the Special Schools.*—Application of the literary knowledge already acquired, and more especially to subjects concerning agriculture, commerce, and industry.

The lessons constituting this course should be mixed, some being purely literary, others being connected with technical matters. The subject of these latter may be the gathering or the extracting of certain raw materials of foreign growth; the history of certain groups of industrial cities, such as Lyons, Geneva, Mulhouse, Rouen, Alais, &c.;

that of certain agricultural regions, such as Normandy, Beance, Burgundy, Herault, the environs of Avignon, of Grasse; finally, the part played by the most important commercial ports, such as Bordeaux, Marseilles, Nantes, Havre, &c. The professor will find among the documents laid before the Chambers, as well as in the correspondence of the Councils, a great number of passages which, together, form a whole, and which may be made available for this course.

Modern Languages.—Conversations between master and pupils on subjects relating to commerce, to industry, to the arts and sciences, and to history, with strict prohibition against using the mother tongue.

Elementary History of Industrial Inventions.—These lessons will be of essential use to the pupils of the special system, for they will constitute the history of the efforts through means of which labour, assisted by intelligence, has secured the triumph of man over matter.

The professor should examine the great industrial enterprises, the creation or development of which have marked new eras in the life of mankind. He should show man successively turning to his advantage his own powers and those of the animals; those of wind and water; of fire, light, and electricity. He should point out that the first steps forward in civilization, from the material point of view, were owing to the discovery of corn, to the invention of the plough, and of the potter's art, and to the extraction of metals from the earth; that is to say, this progress was based on discoveries and inventions connected with natural history, with mechanics, and with chemistry. He should pursue the application of this thought up to the present times, and he should show that this clue having once been found, man has continued to avail himself of it, and that to it he still owes his most brilliant novelties. In speaking of each invention, the professor should exhibit the raw material employed; he should succinctly analyse the operations to which industry subjects it, and he should point out the idea which forms the connecting bond between the operations, and which they, so to say, embody. In this history of the inventions connected with agriculture, industry, and commerce, should be placed, according to rank and date, the biographies of the scholars, the inventors, or the manufacturers, whose genius, and whose activity have realised them; and when the professor has to mention noble characters, such as Berthollet de Fresnel, d'Ampère, or men who have slowly educated themselves by their enormous efforts of perseverance, such as Bernard Palissy, Vauquelin, Jacquard, Philippe de Girard; models of assiduity and industry, of firmness and of devotion, he should throw a strong light on their actions, in order to show how much each one of us has in his power to do to confer honour on his own name, and to serve his country. This history of industrial inventions will thus be at the same time a course of practical ethics, and also the course most conducive to fertile thought, for examples are always the best lessons.

But in order to be able to go back in this way to the creative idea of an industry, the professor must unite to great practical acquaintance with the processes of the arts, an exquisite sentiment of the scientific elements on which they rest, and he must know how to discern in every invention the idea which is, as it were, its very soul, and the means of execution, which are the material part of it. This course cannot, therefore, at present be given, except in a few establishments, where there will be the possibility of intrusting it to a thoroughly competent master.

Recapitulation of General History and Internal History of France from the Accession of Louis XIV to the Present Day.—

Nothing can be learnt in one lesson only, and the mind cannot enter into full possession of a science, except on condition of constantly coming back to it. History, a knowledge of which ought to form an essential part of all education, cannot engrave itself in the memory of the pupils, unless the narratives be repeated twice, and even three times, but from different points of view. The nature of the development of the young mind renders this recapitulation necessary; the mind and judgment of a child, like his body, undergo slow, but continuous and profound transformations. If he interrupts a study with the intention of taking it up again after some months, he finds himself, at the end of this time, furnished with new faculties, which allow him to penetrate further into the questions previously looked into.

Besides, during the first three years, the pupil of the special college, has seen in history the outside of things only, the external life of France and of modern times. In the fourth year he attains to really useful knowledge. He comes back, once more, to the history of his country during the last two centuries, in which agriculture, industry, and commerce have been most largely developed, and he should now hear less of battles, and more of the institutions that guarantee the prosperity of France. After an introductory reference to Henry IV, and Sully, who brought back order into the finances, labour into the fields and the workshops, and established security everywhere, the professor should draw a sketch of the administration of Colbert; should mention the great commercial companies, and should show how Dutch commerce grew up during the seventeenth century. From this subject he should pass on to some details relative to the banks of London and Amsterdam, the establishments of the English in India, the assignats, and the grand livre, the continental blockade, the commercial reforms of Huskisson, European emigration in the nineteenth century, the new colonial policy, &c., &c. This recapitulation should proceed, side by side, with course on public morals, on the history of French literature, the history of industrial inventions, and of general geography; an *ensemble* of studies which will greatly enlighten the minds of the pupils, and will keep alive in their hearts the love of their country.

Commercial and Industrial Legislation.—Merchants and tradesmen, manufacturers and workmen, have, as such, legal rights and duties; they are subject to laws which secure to them certain guarantees, or impose upon them certain obligations, and with which these classes should be well acquainted.

The professor should make the pupils thoroughly understand the distinction between the various operations of commerce, the conditions and the capacities required for being a merchant, the branches of manufacture which come within the rules of legislation, and those which cannot be established without special authorization.

He should point out the part played by the different intermediaries in commerce; commission merchants, factors, brokers, stock-brokers, &c.; he should define the institutions which favour the development of business: chambers of commerce, exchange buildings, marts, fairs, market-places.

The merchant, reduced to his own resources alone, could not carry great enterprises; association of persons and capital, on the other hand, enables men to give an almost illimitable development to commercial operations. The professor should, therefore, make known the local conditions which regulate the various partnerships, joint stock and other companies, without which the construction and working of railways, of docks, of transatlantic mail steamers, &c., would still be mere projects.

The principal articles of the laws relative to banking operations, to commercial assets, protests, bill of exchange, bills to order, and cheques, should also be cited.

The professor should impart some summary notions as to failures and fraudulent bankruptcies; he should explain, more or less in detail, according to the character of the locality, the general laws of our maritime commerce; he should mention the system of customs, of entrepôts, of patents, of apprenticeship, and the authority conferred on the *conseils de prud'hommes*.

Finally, the professor should explain the rules of competency of the mercantile tribunals, and the forms with the aid of which the trader may, in case of contention, obtain the recognition of his rights.

RURAL, INDUSTRIAL, AND COMMERCIAL ECONOMY.—After having explained the object of political economy, the professor should give an idea of the general laws by means of which man makes nature contribute to his wants. He should treat of production in general, of the distribution of wealth, the necessary consequence of the division of labour, of consumption, of revenue, of public contributions. After the statement of general principles, should follow the questions of agricultural enterprise, ablocations, and outlets; of industrial enterprises and industrial property, of associations, of capital, and the part it plays; machinery, and the causes of variations in the rate of interest; tariffs, and routes of communication; currency and savings, credit, banking, insurance, &c.

With the knowledge of the natural and necessary laws on which commerce is founded, the pupil receives the germs of that feeling of confidence, of those rational convictions which contribute to keep up the courage of the well informed members of the industrial classes during moments of political or commercial crises, and which serve to guide and to regulate their conduct.

This course constitutes in a manner the philosophy of the industrial professions, and for this reason it has been placed at the end of the special instruction.

MATHEMATICS.—*Conclusion of Algebra.*—Repetition of equations of the first and second degree with one unknown quantity; problems of the second degree; maxima and minima; progressions; logarithms; use of tables; application to questions of compound interest, to savings banks, to deferred annuities, to mutual benefit societies, to insurances, to annuities, &c.; calculation of the savings which a father must capitalise in order to redeem a debt, to accumulate a dowry, or to leave a certain sum to his children at his death, &c.; numerous exercises on analogous questions.

Notions of Rectilinear Trigonometry.—Establishment of the fundamental formula; use of tables; rules for calculation; resolution of triangles in the most simple cases; exercises.

Eight or ten lessons only should be devoted to these first elements of trigonometry, a knowledge of which is useful for the execution of many practical works.

Common Curves.—Construction of an ellipse by points, and by a continuous movement; tracing of a tangent and a normal; properties of elliptic mirrors; industrial applications of the ellipse and the ellipsoid; identical propositions on the hyperbole and the parabola; reflectors; movement of projectiles; suspension bridges; levelling (*raccordement*) of roads and canals, &c.; elliptical paraboloid; light-houses; ear trumpets, &c.; oval; spiral; screw; helix, &c.

Descriptive Geometry.—Continuation and Conclusion.—All the dia-

grams (*épures*) should, as during the course of the preceding year, be drawn on a fixed scale; each theoretic question should be presented with numerical data, and should thus be transformed into an application, properly so called.

Surfaces in general; generation of surfaces by a line which changes situation and form according to certain laws; conic surfaces; cylindrical surfaces; surfaces of revolution; construction of tangential planes; to determine the shadows of a cylinder of revolution, of a cone (*tronc de cone*); intersection of two surfaces; application to the intersection of two cylinders of revolution of the same radius, and the axes of which meet; intersection of a cylinder and of a cone; ruled surfaces. Notions as to numbered plans; relation between this method and that of projections. Drawing plans; determination of horizontal sections. Outlines of perspective; to construct the perspective of different objects, such as a cross, a door with a flight of steps leading to it, &c., &c.

Many practical exercises, connected with all the parts of the course, should be gone through. The diagrams of descriptive geometry and the plans of buildings should be revised, valued, and signed by the professor.

MECHANICS.—*Continuation and Conclusion.*—The lessons should begin with a succinct recapitulation of the laws of the various kinds of motion, the action of the forces, and the transmission of motion in machines. Next the motive powers commonly used in industry should be examined, viz., animals, water, steam, and wind. Lastly, after a short description of some special motors, the pupils should end with the study of the principal machines in use in the locality.

The professor should take care always to prepare the minds of the pupils by some experimental demonstrations, and by the explanation of the mechanical facts which they may have had opportunities of observing.

He should also place before them small models of machines, for the coloured engravings do not suffice to show the play and the functions of the various organs which they represent.

These models, should, besides be used in the drawing lessons of this year's course. Free-hand sketches (numbered) of them should first be made, thereafter an exact representation with aid of rule and compass, the effects of light and shade being washed in.

The programme of this course, like that of technical chemistry, should vary according to the special industry of each locality: thus the pupils should study, as the case may be, machines employed in metallurgy, or those used for the manufacture of textile fabrics, or for navigation, or in agriculture, &c., &c.

The professor should, therefore, consult the principal manufacturers, &c., of the place before drawing up his programme, and should afterwards present it to the *Conseil de Perfectionnement* for examination and approval. It should subsequently be published by the rector in the journals of the department.

PHYSICS.—*Recapitulation and Complement.*—Some parts of this science present considerable difficulties; it is good, therefore, to go over the same ground several times. The professor should repeat, and at the same time complete and develop, certain theories, such as those of heat, of light, and of optical instruments, besides certain points which may not have been thoroughly understood. But the lessons should retain their elementary and purely experimental character.

At the end of the course applications should be made, if desirable,

to the requirements of the local industry, by taking determinate examples, and submitting to numerical calculation the elements of some industrial undertaking of the kind most common in the locality.

Lastly, recent discoveries of utility or interest should be descanted upon.

CHEMISTRY. — *Technical Chemistry applied to the industry of the locality.*—The instruction given during this year should be practical, industrial, and appropriate to the requirements of the locality. At Caen and Chartres, for instance, agriculture and manures should be the subjects of study; at Creil, Sarrequemines, Toulouse, Limoges, &c., porcelain and pottery; at Cahors, Dijon, Bordeaux, Cognac, Montpellier, &c.. the making of wine, and the distillation of spirits; at Rouen, Mulhouse, Lyons, Saint-Etienne, Vienne, Lodève, &c., the processes of dyeing; at Amiens, Valenciennes, and Lille, the fabrication of sugar; at Atais, Creusot, Langres, and Nancy, metallurgy.

The programme of the course in each of the special schools should be prepared by the professor, submitted to the Conseil de Perfectionnement, and published by the rector, as mentioned with respect to the course of mechanics.

Part of the Thursday morning and Sunday afternoons are devoted to manipulations, and to visits to the principal industrial establishments in the environs.

NATURAL HISTORY, *applied to Agriculture, Industry, and Hygienics.*

Zoology.—The professor should treat of animals as the producers of alimentary substances; consequently of the breeding and fattening of cattle, sheep, &c.; next he should consider the animals as producers of motive power, &c. The structure and growth of the hair will furnish him with opportunities for speaking of furs and wools, and of the trade of the nations of the far north, of the influence of climate and seasons on the fur of animals; he should descant upon the horny substances, the mode of their formation, and the uses to which they are put; hoofs, horns, tortoise-shell, whalebone. He should terminate with the history of insects useful, or hurtful to agriculture: on the one hand the ichneumons, and the other parasites; cantharides, cochenille, silk-worms, bees, &c.; on the other hand wasps, grasshoppers, weevils, caterpillars, and the insects which attack the vines and the olive trees.

The course of botany should continue this year with respect to the monocotyledons and the rest of the vegetable kingdom, that which was done with respect to the dicotyledons during the course of the preceding year. Cereals, the vegetation of the prairies, the sugar cane, palm trees, and their various and important products, should be studied during the first lessons. The acotyledons furnish an opportunity of narrating to the pupils many interesting details regarding lichens and their alimentary and colouring properties, respecting seaweeds and their uses in agriculture, concerning edible and poisonous mushrooms, truffles, rush, and other diseases of vegetables caused by parasitical fungi.

The professor should continue to encourage the pupils to collect as great a number of plants as possible, and should assist them in analysing the principal organs, and determining the families, the genera and the species to which the plants belong. Some of the regular walks should be exchanged for herborizations, which should not be directed so much

towards gathering a great number of different species, or exploring a great extent of country, as towards studying minutely a limited portion of the country, and determining with care the plants which compose the local flora, or which are cultivated there.

The course of geology should be completed by some notions of meteorology, which ought to have a place in the system of special instruction. The sea and the composition of its waters, the atmosphere and its perturbations; the study of the winds, and of the clouds, of climates, and their influence on the geographical distribution of the various plants: orange trees, olive trees, vines, cereals, fruit trees, forest trees, &c., &c.

The science of hygienics is a complex one, which demands a knowledge of several other sciences, viz., of chemistry, physics, and physiology. The pupils of the special schools should not therefore go through a complete course of hygienics, but should merely be taught the principal results to which the study of this science has led. The part played by alimentation; the influence of age, of rest, of labour on the organism; the exigencies of a wholesome alimentary regimen; the dangers of the use of alcoholic drinks; suspended animation; assistance to be given to persons suffering from asphyxia; the ventilation of dwelling-houses and of stables; the dangers of unhealthy dwellings; statistics showing the gradual increase in the average duration of life in France, which has taken place in proportion to the increase in the general well being.

Commercial Accounts.—The course of the first three years is calculated to form bookkeepers; the object of the fourth course is the study of accounting (*comptabilité*) properly so called. The instruction herein should enable the young men to establish systems of account for all kinds of commercial and industrial undertakings; it teaches them to open books, to draw up inventories, and to understand later how the operations of merchants, commission agents, bankers, &c., are combined; summary explanation of the knowledge necessary for a banker; calculations of commission; examples of fictitious operations, for the purpose of showing how the accounts between a merchant and his agent are established and regulated; making up of merchants and bankers balances; organization of the documents, and of the auxiliary books of bankers, shipowners, &c., &c. Lastly, establishment of a general system of accounts, comprising the operations of bankers, of shipowners belonging to various countries, who fit out vessels, send them on voyages, engage in commercial transactions with each other, and draw up their inventories. Finally, some notions of our financial system, and of the institution of the *Cour des Comptes* (Court of Accounts).

Drawing.—Free-hand drawing of trees, ornaments, flowers, animals, and plants from nature; many exercises from memory, some original compositions, and a certain number of drawings from casts; some of these drawings may be done in outline with the pen, and shaded with a brush.

During the lessons in geometrical drawing, the pupils who have already learnt to make plans of separate pieces of machinery should draw from sketches previously made by themselves, entire machines on a given scale.

They should also copy drawings suited to the industry of the locality, such as designs for silk textures at St. Etienne, for laces at Puy, &c., &c.

Pupils who show a decided talent for sculpture, may also do a little modelling in clay from *bassi-relievi* in plaster.

All the models should be selected by the *Conseil de Perfectionnement.*

GYMNASTICS.—Running and marching, with accompaniment of singing, and other exercises, as in the preceding courses.

SINGING.—Continuation of the sol-fa exercises, of musical dictations, singing in unison, and in two, three, and four parts.

Elementary notions of harmony; principal consonant and dissonant accords; their fundamental position; their reversal; their connection; shorthand annotation of harmonies, numbered bass.

Cadences: perfect, imperfect, broken, &c.; suspension; use of pedals.

Accompaniment to singing.

Studies of sacred music; differences between the modes of music and the modes of church music; notions of plain song; musical plain song; execution of some pieces of Palestrina, Handel, &c.

Abridged history of music; æsthetical ideas resulting from the analysis of a few works of modern dimensions selected from the Italian, French, and German schools.

DURATION OF THE LESSONS AND EXERCISES.—The pupils who enter the preparatory course are, on an average, twelve years of age; it is, therefore, necessary that the school day should be divided among short and varied exercises, that the young minds may not be fatigued, and that their attention be kept ever alive. Each lesson in class, as also the subsequent preparation for lessons (*études*) ought not to last longer than one hour; the tasks given should not be longer than that they may be completed in this time.

In all the schools of central Europe it is admitted that the attention of children cannot be kept up for two consecutive hours, and that if professors have to speak during such a period of time, they cannot do so without considerable fatigue. Even in France in some large private establishments and in the *lycée* of the Prince Imperial, the practice of shorter lessons in class has been introduced; experience has, therefore, already been gained.

But whatever may be the duration of a lesson, the pupil will derive but little benefit from it if it be not immediately followed by a time of study during which he may repeat to himself and reflect upon the subject treated by the professor, make the manipulations indicated in the class, write an appropriate theme, or prepare the exercises, or interrogatories which have reference to the lesson. It is, therefore, to be desired that each lesson in class should have for its complement one hour's solitary study at least.

Some persons desire, on the contrary, that the lesson in class should be preceded by study as in England, where the master chooses a good work as a text book, of which the pupils study certain fragments at a time, without any other aid than their own powers and will. The professor questions them closely on this fragment, assures himself that the pupil has mastered the ideas of the part of the book which he has studied by himself, explains the most difficult passages, and adds some observations to complete or to correct the work of the pupil.

This system also produces excellent results, it is already adopted in France with respect to the reading of literary works, but in the special colleges the two methods should be combined. The pupils who constitute the preparatory class know little or nothing, their memory alone has been called into play, and their reflective powers have remained almost completely inactive; they, therefore, require many lessons, but short ones, frequently repeated; and the instruction in class should be

followed by a time of study, during which they should endeavour to commit to memory the notions which have been imparted. Later, when their minds are furnished with the ideas acquired, and judgment comes to the aid of memory, this solitary study will become more fertile in results, and it will then be good to make the pupils get up, before the class lesson, the subject which the professor proposes to treat.

In establishments where the pupils were all residents (*internes*) this regular succession of class and study might be introduced without difficulty, because in these cases the occupations of the whole day, from sunrise till sunset, might be regulated by the heads of the establishments; but the special schools will be mostly composed of day scholars (*externes*), the whole of the instruction must, therefore, be comprised between eight o'clock in the morning and four or five o'clock in the afternoon, in order that the day scholars may have the advantage of all the lessons and exercises.

This consideration precludes the laying down of any absolute rule for the employment of time in the schools. It is merely established as a principle that each lesson in class, during the first years at least, should not exceed one hour, excepting the lessons in composition which may be prolonged; that the pupils should be allowed, after two hours of work, an interval of ten minutes or a quarter of an hour, which should be employed in gymnastic exercises, without prejudice to the longer periods of recreation which follow the meals, and finally, that, except during the last year, all evening work should be interdicted.

Extracts of the Law on Public Instruction adopted by the National Assembly, 15th March, 1850.

1st Title.—On the Authorities presiding over the System of Instruction.

Chapter I.—*Superior Council of Public Instruction.*

Art. 1.

The Superior Council of Public Instruction is composed as follows:—

The Minister of Public Instruction, president.

Four archbishops or bishops, elected by their colleagues.

A minister of the Reformed Church, elected by the Consistories.

A minister of the Church of the Augsburg Confession, elected by his colleagues.

A member of the Central Israelite Consistory, elected by his colleagues.

Three Councillors of State, elected by their colleagues.

Three members of the *Cour de Cassation*, elected by their colleagues.

Three members of the Institute, elected by a general assembly of the Institute.

Eight members nominated by the President of the Republic in a Council of the Ministers, and selected from among former members of the Council of the University, inspectors general, and superior inspectors, and the rectors and professors of the various faculties. These eight members form a permanent section.

Three members belonging to private schools, and nominated by the President of the Republic, on the proposal of the Minister of Public Instruction.

Art. 2.

The members of the permanent section are nominated for life. They cannot be dismissed except by order of the President of the Republic in a Council of Ministers, and at the proposal of the Minister of Public Instruction.

These members only are salaried.

Art. 3.

The other members of the Council are elected for six years, and are indefinitely re-eligible.

Art. 4.

The Superior Council shall assemble at least four times in the year.

The minister may convoke an extraordinary meeting whenever he considers it desirable.

Art. 5.

The Superior Council may be called upon to give its opinion on projects of law, regulations and decrees relative to public instruction, and in general on all subjects submitted to it by the Minister.

It must necessarily give its opinion on the regulations concerning the examinations, the competitive examinations (*concours*), and the programmes of studies in the public schools, concerning the superintendence of private schools, and in general on all legal measures relative to the public schools.

On the creation of faculties, lycées, and colleges.

On the amount of aid and encouragement to be given to private schools belonging to the system of secondary instruction.

On the books which may be introduced into the public schools, and on those which ought to be prohibited in private schools, as contrary to morality, to the constitution, and to the laws.

It shall pronounce, in the last instance, on the judgments given by the academical councils in the cases laid down in Art. 14.

The Council shall, every year, present to the Minister a report on the general state of instruction, on the abuses which may have crept into the schools, and on the means of remedying these.

Art. 6.

The permanent section is charged with the preparatory examination of questions relative to the police, to the financial accounts, and (*la comptabilité*) to the administration of the public schools.

It shall, whenever consulted by the Minister, give its opinion on questions relative to the rights and to the advancement of the teachers.

It should each year present to the Council a report on the state of instruction in the public schools.

CHAPTER II.—*Academical Councils.*

Art. 7.

An academy shall be established in each department.

Art. 8.

Each academy shall be administered by a rector, assisted, if the

minister deems it advisable, by one or more inspectors, and by an academical council.

Art. 9.

The rectors should not be chosen exclusively from among the members of the scholastic profession (*membres de l'enseignement public*).

They should have the degree of licentiate, or ten years' practice as inspector of an academy, as head master, censor, head of a private school, or professor in one of the higher classes, either of a private or public establishment.

Art. 10.

The academical council is composed as follows:—

The rector, who presides.

An inspector of academies, a teacher in, or an inspector of, primary schools, designated by the Minister.

The prefect, or his delegate.

The bishop, or his delegate.

An ecclesiastic, designated by the bishop.

A minister of one of the two Protestant churches, designated by the Minister of Public Instruction, in the departments in which one of these churches is legally established.

A delegate of the Israelite Consistory, in every department in which such a consistory is legally established.

The *Procureur Général* of the Court of Appeal, in the towns in which there is such a court, and in others the *Procureur de la République* of the lower court (*tribunal de première instance*).

A member of the Court of Appeal elected by the court, or otherwise a member of the lower court, elected by it.

Four members elected by the General Council, two of which at least must be chosen from among its own members.

The deans of faculties should, moreover, have a deliberative voice in the academic council as to all matters concerning their respective faculties.

The presence of half the number of members, and one over, is necessary to form a quorum.

Art. 11.

Treats of the academic council for the department of the Seine, specially constituted.

Art. 12.

The members of the academic council who are nominated by election, are chosen for three years, and are indefinitely re-eligible.

Art. 13.

The departments shall provide a suitable locality for the service of the academic administration.

Art. 14.

The academic council shall give its opinion on the state of the different schools established in the department.

On the reforms to be introduced in the various branches of instruction, in the discipline, and in the administration of the public schools.

On the budgets and the administrative accounts of the lycées, the colleges, and the normal primary schools.

On the aid and assistance to be given to the primary schools.

It shall attend to the disciplinary matters relative to the members

of the scholastic profession connected with secondary and superior public instruction, referred to it by the Minister or the rector.

It shall give judgment (subject to appeal to the superior council) in all contested questions relative to the obtaining of degrees, to the competitive examinations by the various faculties to the opening of private schools, to the rights of particular teachers, and to the exercise of the right of teaching; in cases of legal proceedings against members of the scholastic body in connection with secondary instruction, and tending to the revocation of their rights, prohibiting them also from following the profession of private teacher, or of head of, or professor in a private school, and, in the case determined by the present law on disciplinary matters, relating to teachers in primary schools, either public or private.

Art. 15.

The academic council must necessarily be consulted as to the regulations bearing on the internal management of the lycées, the colleges, and the normal primary schools, and as to the regulations of the public primary schools.

It shall fix the rate of the school fees (*la rétribution scolaire*), after consulting the municipal councils and the delegates of the canton.

It shall determine, according to circumstances, in what cases the communes may or may not be allowed to establish or preserve, provisionally, primary schools, in which children of either sex, or children belonging to the different forms of worship recognised by the State, shall be admitted.

It shall give its opinion to the rector on the remuneration to be paid to the primary teachers.

The rector shall submit the proposal to the Minister, and shall distribute the remuneration granted.

Art. 16.

The academic council shall each year present to the Minister and to the council general, a statement of the condition of the schools (*l'enseignement*) in the departments.

The reports of the academic council shall be transmitted through the rector to the Minister, by whom they will be communicated to the superior council.

Chapter III.—*On the Schools and the Inspection of them.*

Section 1st.—*On the Schools.*

Art. 17.

The law recognises two kinds of primary or secondary schools:

1st. The schools founded or supported by the communes, the departments, or the State, and which are designated public schools.

2nd. The schools founded or supported by private individuals, or associations, and which are designated private schools (*écoles libres*).

Section 2nd.—*On the Inspection.*

Art. 18.

The inspection of the public as well as the private schools is performed:—

1st. By the inspectors general, and the superior inspectors.

2nd. By the rectors and inspectors of academies.

3rd. By the inspectors of primary schools.

4th. By the delegates of the canton, the mayor, the curé, the pastor, and the delegate of the Israelite consistory, in as far as concerns primary instruction.

The ministers of the divers forms of worship shall only inspect the schools belonging to their forms of religion, or in the mixed schools, only those matters which concern their co-religionists.

The rector may, in case of his being prevented, delegate the inspection temporarily to a member of the academic council.

Art. 19.

The inspectors of academies are selected by the Minister among former inspectors, professors of the different faculties, head masters, and censors of lycées, principals of colleges, heads of private secondary schools, teachers in the upper classes in these various categories of schools, graduates of the faculties and of the lycées, and inspectors of primary schools, on condition, in each case, of their having attained the degree of licentiate, or of their having ten years' practice.

The inspectors general and the superior inspectors are chosen by the Minister, either in the classes mentioned above, or among former inspectors general, or superior inspectors of primary schools, the rectors and inspectors of academies, or among the members of the institute.

Before nominating an inspector-general, the Minister must take the opinion of the superior council.

Art. 20.

The inspection of the primary schools is specially intrusted to two superior inspectors.

There is, besides, in every *arrondissement* an inspector of primary schools, chosen by the Minister after consulting with the academic council.

Nevertheless, on the advice of the academic council, two *arrondissements* may be united for the purpose of inspection.

Special regulations will determine the classification, the promotion, and the powers (*attributions*) of the inspectors of primary schools.

Art. 21.

The inspection of the public schools shall be performed in accordance with regulations determined upon by the superior council.

The inspection of the private schools relates to morality, hygienics, and salubrity.

It must not interfere with the instruction, except to ascertain that it is not contrary to morality, to the constitution, and to the laws.

Art. 22.

Every head of a primary or secondary school who refuses to submit to the superintendence of the State, such as prescribed by the preceding article, shall be summoned before the correctional tribunal of the *arrondissement*, and condemned to a fine of from 100 francs to 1,000 francs.

In case of a recurrence the fine shall be from 500 francs to 3,000 francs. If the refusal to submit to the surveillance of the State has given rise to two condemnations in one year, the closing of the establishment may be ordered by the judgment which pronounces the second condemnation.

The reports of the inspectors giving notice of the refusal of the head of the establishment to conform to the law, shall be received as worthy of faith, until proved false.

2nd Title.—On Primary Instruction.

Chapter I.—*General Regulations.*

Art. 23.

Primary instruction comprises:—
Moral and religious teaching.
Reading.
Writing.
The elements of the French language.
Cyphering and the legal system of weights and measures.
It may comprise in addition to this:—
Arithmetic applied to practical operations.
The elements of history and geography.
Some notions of the physical sciences and of natural history applicable to the uses of life:
Elementary instruction in agriculture, industry, and hygienics.
Land measurement, levelling, and linear drawing, singing, and gymnastics.

Art. 24.

Primary instruction shall be given gratuitously to all children whose families are unable to pay for them.

Chapter II.—*On the Teachers.*

Section 1st.—*On the Conditions under which the Profession of Teacher in Primary Schools, whether Public or Private, may be Exercised.*

Art. 25.

Every Frenchman who has completed his twenty-first year may exercise the profession of teacher in a public or private primary school, if he has obtained a certificate of capacity (*brevet de capacité*).

For the certificate of capacity may be substituted a certificate of service as pupil teacher (*certificat de stage*), as mentioned in Art. 47, the diploma of bachelor, a certificate proving that the candidate has been admitted into one of the special schools of the State, or the title of minister (neither interdicted nor revoked) of one of the religions recognized by the State.

Art. 26.

Incapable of keeping a public or a private school, or to be employed in such, are all individuals who have been condemned for crimes, or for any offence against honesty or morals, individuals deprived by judgment of all, or part of, the rights mentioned in Article 42 of the Penal Code, and those who are interdicted in virtue of Articles 30 and 33 of the present law.

Section 2.—*Of the Conditions applying specially to Private Teachers.*

Art. 27.

Every teacher who would open a private school must previously declare his intention to the mayor of the commune in which he intends

to establish himself, must indicate the house in which the school is to be kept, and further state where he has resided, and what professions he has exercised during the ten preceding years.

This declaration must besides be addressed by the candidate to the rector of the academy, to the *procureur* of the Republic, and to the *sous-préfet*.

The mayor shall take care that it be posted on the door of the *mairie* during one month.

Art. 28.

The rector may, either in virtue of his office, or at the instigation of the *procureur* of the Republic or the *sous-préfet*, raise opposition to the opening of the school, in the interest of public morals, during the month following the declarations made to him.

Judgment as to this opposition shall be given by the academic council within a short delay, without the rights of appeal.

If the mayor refuse to approve of the house selected, the academic council shall determine upon the refusal.

In default of opposition, the school may be opened without further formalities at the expiration of the month.

Art. 29.

Whoever opens or undertakes the direction of a school in contravention of Articles 25, 26, and 27, or before the expiration of the term fixed by the last paragraph of Article 28, shall be cited before the correctional tribunal of the place where the offence has been committed, and shall be condemned to pay a fine of from 50 to 500 francs.

The school shall be closed.

In case of repetition of the offence the delinquent shall be condemned to imprisonment for a period of from six days to one month, and to a fine of from 100 francs to 1,000 francs.

The same penalty of six days or one month's imprisonment, and of a fine of from 100 francs to 1,000 francs, shall be adjudged against any one who shall open a school in defiance of the opposition raised against it, and before this opposition has been pronounced upon, or who shall open a school in contempt of the decision of the academical council confirming the opposition.

Persons who from purely charitable motives and with the authorization of the cantonal delegate, undertake to teach poor children to read and to write, shall not be considered as keeping a school.

Nevertheless, their authorization may be withdrawn by the academical council.

Art. 30.

Any private teacher may, on the complaint of the rector, or of the *procureur* of the Republic, be cited before the academic council of the department to answer for grave faults in the exercise of his functions, and may be censured or suspended from his office for a time not exceeding six weeks, or may be interdicted from following his profession in the commune.

The academic council may even punish him with absolute interdiction, against which, however, he may appeal to the Superior Council of Public Instruction.

Section 3rd.—*On the Communal Teachers.*

Art. 31.

The communal teachers are nominated by the municipal council of

each commune, and are selected from a list of "admissibility and promotion" drawn up by the academic council of the department, or, in as far as concerns members of the various religious bodies, on the representation of their superiors.

The Consistories enjoy the right of presentation in the case of teachers belonging to the non-Catholic religions.

If the municipal council should make a selection not in conformity with the law, or if it should fail to make a choice, the nomination shall be supplied by the academic council, within a month after notice addressed by the rector to the mayor.

The appointment is given by the Minister of Public Instruction.

Art. 32.

The communal teachers are prohibited from exercising any administrative functions, without the authorization of the academic council.

The exercise by them of any commercial or industrial profession is absolutely prohibited.

Art. 33.

The rector may, according as the case may be, reprimand, suspend, with or without partial, or total privation of salary, for a period not exceeding six months, or dismiss the communal teacher.

The teacher thus dismissed is thereby incapable for exercising the profession of either private or public teacher in the same commune.

The academic council may, after having heard his appeal, punish him with absolute interdiction to teach, against which judgment he shall, however, have right of appeal to the superior Council of Public Instruction within a delay of ten days from the time of the notification of the decision.

In case of urgency the mayor may provisionally suspend the communal teacher, but with obligation to render an account to the rector within ten days.

Art. 34.

The academic council shall determine according to the number of the pupils, which public schools should have an assistant teacher attached to them.

The assistant teachers may be no more than eighteen years of age, and are not subject to the conditions contained in Art. 25.

They are nominated, and may be dismissed by the schoolmaster, with the consent of the rector of the academy. The assistant teachers belonging to the religious associations mentioned in Art. 31 are nominated, and may be dismissed, by the heads of those associations.

The municipal council determines the salary to be paid to the assistant teachers. This salary is exclusively charged on the commune.

Art. 35.

All departments are bound to provide for the supply of communal teachers, by maintaining pupil teachers, either in such primary schools as shall be designated by the academic council, or in the normal school established for this purpose in the department.

The normal schools may be suppressed by the council-general of the department: they may likewise be suppressed by the Minister, in superior council, on the report of the academic council, without prejudice in both cases to the rights of the exhibitioners in enjoyment of exhibitions.

The programme of the lessons, the conditions of admission, and of

leaving, as also those relative to the nomination of the staff (*personnel*), and all matters concerning the normal schools shall be determined by regulations to be deliberated upon in the superior council.

Chapter III.—*On Communal Schools.*

Every commune must maintain one or more primary schools.

The academic council of the department may authorize a commune to join one or several neighbouring communes, for the support of a school.

Every commune is entitled to maintain one, or several schools for gratuitous instruction, provided it be entirely at the expense of the commune.

The academic council may exempt a commune from maintaining a public school, on condition of its providing for the gratuitous instruction, in a private school, of all the children of families who are too poor to pay. This exemption may at any time be withdrawn.

In those communes where the different forms of religious worship are publicly professed, separate schools shall be established for the children of those religions, without prejudice to what is laid down in Art. 15.

The commune may, with the authorization of the academic council, demand that the communal schoolmaster shall give the entire, or part, of the course of instruction mentioned in Art. 23.

Art. 37.

Every commune shall provide the schoolmaster with a suitable tenement for his own residence, as well as for the school, with furniture for the class-rooms, and with a salary.

Art. 38.

Dating from the 1st January, 1851, the remuneration of communal schoolmaster shall consist:—

1st. Of a fixed salary not under 200 francs.

2nd. Of the school fees.

3rd. Of a supplementary sum to be granted to all those whose remuneration in study, including the school fees, does not amount to 600 francs.

The supplementary sum shall be calculated according to the total of the school fees received during the preceding year.

Art. 39.

A pension fund (*caisse de retracte*), shall by a regulation of the public administration, be substituted for the savings bank of the teachers.

Art. 40.

In default of foundations, donations, or legacies, the municipal council shall deliberate on the means of providing for the expenses of primary education in the commune.

In case of deficiency of the ordinary revenues, this expenditure shall be provided for by means of a special impost voted by the municipal council, or in default of a vote of this council, levied by a decree of the Executive. This tax, which should be authorized every year by the financial law, must not exceed three centimes, in addition to the four direct taxes.

When communes, either by themselves, or by joining other communes, are unable to provide, in the manner just indicated, for the expenses of the communal schools, provision shall be made for them out of the ordinary resources of the department, or in case of insufficiency, by means of a special impost voted by the council-general, or default of such a vote, established by a decree. This impost, authorized annually by the financial law, must not exceed two centimes in addition to the four direct taxes.

If the communal and departmental resources do not suffice, the Minister of Public Instruction will make a grant from the fund voted every year in the annual budget for the purposes of primary instruction.

Every year a report, annexed to the draft of the budget, shall make known the manner in which the fund of the preceding year has been expended.

Art. 41.

The school rate shall be levied in the same manner as the other direct public taxes.

However, when deemed desirable by the council-general, the communal schoolmaster may be authorized by the academic council to levy the school rate himself.

CHAPTER IV.—*On the Cantonal Delegates, and the other authorities presiding over Primary Instruction.*

Art. 42.

The academic council of the department shall designate one or more delegates residing in each canton, to superintend the public and private primary schools of the canton, and to determine which of the private schools are to be placed under the supervision of each.

The delegates are nominated for three years; they are re-eligible, and may be dismissed. Each delegate shall correspond with the academic council, to whom his reports must be addressed, as also with the other local authorities, concerning all matters connected with the condition and the needs of the schools placed under his supervision.

He may, when not a member of the academic council, take part in its sittings, with a consultative vote on matters concerning the schools within his circumscription.

The delegates shall assemble once every three months in the principal place of the canton, under the presidency of one of their number, to deliberate on the report to be made to the academic council.

Art. 43.

Determines similar meetings of delegates of the arrondissements in Paris for the same purpose, under presidency of the mayor.

Art. 44.

The local authorities entrusted with the supervision and moral guidance of the primary schools are the mayor, the curé, the pastor, or the delegate of the Jewish consistory, and in communes with a population of two thousand and upwards, one or more of the inhabitants of the commune, delegated by the academic council.

The ministers of the different forms of worship are specially charged with the superintendence of the religious instruction in the school.

Admission to the school shall always be open to them.

In the communes where there are mixed schools, a minister of each form of worship shall at all times be freely admitted to watch over the religious instruction of the children belonging to his confession.

When each confession has separate schools, the children belonging to one form of worship shall not be placed in a school belonging to another, unless by the express wish of their parents.

Art. 45.

The mayor, in concert with the ministers of the different forms of worship, shall every year draw up a list of the children who are to be admitted gratuitously into the public schools. This list must be approved by the municipal council, and definitively settled by the prefect.

Art. 46.

Every year the academic council shall nominate a commission of examination, charged with giving public judgment at periods fixed by the rectors, as to the aptitude of persons seeking to obtain the certificate of capacity, to whatever locality they may belong.

This commission shall be composed of seven members, and shall elect its own president.

An inspector of primary schools in the arrondissement, a minister of the religion to which the candidate belongs, and two members of the scholastic profession, attached either to public or private schools, shall necessarily form part of the commission.

The examination shall only bear upon the matters comprised in the first part of Art. 23.

The candidates who desire to be examined in all, or some of the other subjects specified in the same article, should make their wish known to the commission. The certificates given shall make mention of the special subjects in which the candidates have passed the examination satisfactorily.

Art. 47.

The academic council shall, when called upon so to do, give certificates of service (*stage*) to persons who prove that they have, for three years at least, given instruction in the subjects comprised in the first part of Art. 23, in public or private schools, authorized to receive apprentices (*des stagiaires*). The pupil teachers shall, during their apprenticeship, be specially watched over by the inspectors of primary schools.

CHAPTER V.—*On Girl Schools.*

Art. 48.

Primary instruction in girl schools comprises needlework, in addition to the subjects of instruction mentioned in Art. 23.

Art. 49.

Letters of obedience shall take the place of the certificate of capacity, as regards female teachers belonging to the religious congregations devoted to teaching, and recognized by the State.

The examination of female teachers shall not take place in public.

Art. 50.

All matters having reference to the examination of female teachers, and to the superintendence and inspection of girl schools, shall be

determined by regulations drawn up and deliberated upon in the superior council. The other dispositions of the present law relative to the schools and to the schoolmasters shall be applicable to girl schools and to female teachers, with exception of Articles 38, 39, 40, and 41.

Art. 51.

Every commune with a population of 800 souls, or more, is bound, if its means allow of it, to have at least one girl school, without prejudice to what has been said in Art. 15.

The academic council may, besides, oblige communes with a smaller population to support, if their ordinary resources will admit of it, one girl school; and in case of the union of several communes for the purpose of establishing primary schools, it may decide that the boy school and the girl school shall be located in different communes. The opinion of the municipal council should be taken on this.

Art. 52.

No public or private primary school can, without the authorization of the academic council, admit children of both sexes, if there be in the commune a public or private school for girls.

Chapter VI.—*On Complementary Institutions.*

Section I.—Primary Boarding Schools.

Art. 53.

Every Frenchman having attained the age of 25, and having had, at least, five years' experience as a schoolmaster, or as a teacher in a primary boarding school, and who further fulfils all the conditions enumerated in Art. 25, may open a primary boarding school, after having declared his intention to the rector of the academy and to the mayor of the commune. However, communal schoolmasters cannot open boarding schools without the authorization of the academic council, given according to the advice of the municipal council.

The programme of the instruction to be given, and the plan of the house must be submitted to the mayor and to the rector.

The academic council shall prescribe, in the interest of the morality and of the health of the pupils, all the measures which will be indicated in regulations drawn up after deliberation, by the superior council.

Primary boarding schools are subject to the provisions of Articles 26, 27, 28, 29, and 30 of the present law, and to the superintendence of the authorities which it establishes.

These provisions are applicable to boarding schools for girls also, in as far as they are not contrary to the conditions prescribed by the 5th Chapter of the present law.

Section II.—Schools for Adults and Apprentices.

Art. 54.

Primary communal schools may be established for adults above 18 years of age, and for apprentices above the age of twelve.

The academic council shall designate the teachers intrusted with the direction of communal schools for adults and apprentices.

In these schools pupils of the two sexes cannot be received together.

Art. 55.

Articles 27, 28, 29, and 30 are applicable to persons who would open private schools for adults and apprentices.

Art. 56.

The Minister of Public Instruction will every year, in his budget, open a credit for encouraging the production of books and methods useful for primary instruction, and also for encouraging the foundation of institutions, such as,

Sunday schools.

Schools in workshops and factories.

Classes in the hospitals.

Public classes opened conformably to Art. 77.

Libraries of useful books.

And other institutions the statutes of which shall have been submitted to the examination of the competent authority.

Art. 57.

Section III.—Infant Asylums (*Salles d'asile*).

Infant asylums may be public or private.

A decree of the President of the Republic, issued according to the advice of the superior council, will determine everything relating to the supervision and inspection of these establishments, as well as to the conditions of age, aptitude, and morality of the persons charged with the care of the public asylums, and will also determine the instruction to be given, &c., &c.

Art. 58.

The persons in charge of the public infant asylums shall be nominated by the municipal council, subject to the approbation of the academic council.

Art. 59.

Private infant asylums may receive grants from the funds of the communes, of the departments and of the State.

3rd Title.—On Secondary Instruction.

Chapter I.—*On Private Schools for Secondary Instruction.*

Art. 60.

Every Frenchman, having attained the age of 25, and being subject to none of the incapacities mentioned in Art. 26 of the present law, may establish a school for secondary instruction, on condition of his making to the rector of the academy where he proposes to open the school, the declarations prescribed in Art. 27, and of depositing in the hands of the rector the following documents.

1st. A certificate of service (*certificat de stage*) showing that he has during five years at least, performed the functions of a teacher, or of a *surveillant* in a private or public school.

2nd. The diploma of bachelor, or a certificate of capacity awarded by an examining jury, in the form determined by Art. 62.

3rd. The plan of the school-house, and a statement of the subjects of instruction.

Articles 61, 62, 63, 64, 65, 66, 67, and 68, determine the further

details as to the nomination and examination of candidates, the conditions on which they may open schools, the penalties incurred by neglect of these, and the faults by which the schoolmasters forfeit the right to continue their functions.

Art. 69.

Private schools may obtain from the communes, from the departments, and from the State, a school house (*locale*), and a grant, which must not, however, exceed one-tenth of the annual expenses of the establishment.

The academic councils shall previously be consulted as to the advisability of these grants.

Art. 70.

The secondary ecclesiastical schools already existing, may continue in existence on condition of their submitting to the supervision of the State.

New ones cannot be established without the authorization of the Government.

CHAPTER II.—*On Public Schools for Secondary Instruction.*

Art. 71.

The lycées and the communal colleges constitute the public schools belonging to the system of secondary instruction.

To these lycées and colleges boarding houses may be attached.

Art. 72.

The lycées are founded and supported by the State, with the concurrence of the departments and the towns.

The communal colleges are founded and supported by the communes.

They may be subsidized by the State.

Art. 73.

Every town in which the communal college is at the command of the municipal council, to be erected into a lycée, must bear the expense of the building and the acquisition of land necessary for the purpose, must provide the furniture, and the collections required for the purposes of instruction, and must undertake to keep the buildings in repair.

The towns that wish to establish a boarding house in connexion with the lycée, must provide the necessary house-room and furniture, and must, with or without the concurrence of the department, found for ten years a certain number of *bourses*, the amount of which shall be fixed by agreement with the minister. At the expiration of the ten years, the towns and the departments shall be at liberty to suppress these *bourses*, but without prejudice to the exhibitioners actually in enjoyment of the *bourse*.

In case the State wishes to retain the boarding establishment, the house and the furniture shall remain at its disposal, and shall not return to the commune until the establishment shall be suppressed.

Art. 74.

The subjoined conditions must be satisfied by all towns wishing to establish a communal college.

They must furnish premises suitable for the purpose, and undertake to keep them in repair; they must provide the necessary furniture for

the class-rooms, and if the establishment is to receive resident pupils, also the household furniture; they must guarantee for at least five years the fixed salaries of the principal of the college, and of the professors, which shall be considered as an expense obligatory on the commune, in case the revenues of the college accruing from the collegiate fees paid by the day scholars, and the product of the boarding establishment, should prove insufficient.

Towns which have founded communal colleges irrespective of these conditions, are bound to comply with them within two years.

Art. 75.

The object and the extent of the instruction in each communal college shall be determined, with due regard for the wants of the locality, by the Minister of Public Instruction in the superior council, and on the proposal of the municipal council, approved by the academic council.

Art. 76.

Determines the penalties incurred by teachers for various offences.

4TH TITLE.—GENERAL REGULATIONS.

Art. 77.

Determines that the provisions of the present law are applicable to public classes on matters comprised in primary or secondary instruction.

Art. 78.

Determines the conditions on which foreigners can be allowed to open schools.

Art. 79.

Mentions the functionaries and students connected with public instruction, who may be exempted from military service, on certain conditions.

CONDITIONS OF ADMISSION TO THE IMPERIAL CENTRAL SCHOOL OF ARTS AND TRADES.

The Imperial Central School of Arts and Manufactures, founded in 1829, has become, by the provisions of the law of 19th June, 1857, a state establishment, and is placed within the competency and under the direct authority of the Minister of Agriculture, Commerce, and Public Works. It remains specially destined to educate engineers for all branches of industry, and for the public works, the direction of which does not necessarily belong to the Government engineers.

Diplomas of Engineer of Arts and Trades are delivered annually by the Minister to the pupils designated by the school council as having passed through the entire competitive examination in a completely satisfactory manner.

Certificates of capacity are granted to those who, having not passed through all the subjects of the examination in a perfectly satisfactory manner, have nevertheless given proof of sufficient knowledge in the most important branches of the instruction.

The school receives day scholars only. Foreigners can be admitted,

and on the same conditions as natives. The duration of the studies is three years.

The cost of instruction, comprising the expenses of the various manipulations, is 800 francs annually.

Independently of these 800 francs, the pupils must deposit in the school treasury at the commencement of every year, a sum of 35 francs, as a guarantee for such objects belonging to the school as may be lost or spoilt by their fault. This deposit, which must at each term of payment (there are three in the year) be maintained at the total of 35 francs, is reimbursed to each pupil at the end of the year, or when he leaves the school, if there be no account against him.

Each pupil must, on entering the school, be provided with the objects and list of what will be delivered to him, and which a duly authorized purveyor, residing in the school will furnish, on demand, at a price fixed each year by the director.

Subsidies may be granted by the State to pupils who are at one and the same time recommended by the high position they take in the school, after the various examinations, and by want of means. These grants are made for one year only, but may be continued, and even augmented, in favour of pupils who render themselves worthy thereof, by their conduct and by their progress in knowledge.

The State subsidies may be cumulated by allowances granted to the pupils by the departments and the communes.

The total of the subsidies are paid into the school treasury.

If the total of the grants obtained by a pupil exceeds the cost of instruction, one-twelfth of the surplus is paid to him, every month, for his board.

Candidates who desire to obtain a share of the State grants, must make a written declaration to that effect, to be sent in to the *prefecture* of the department. This declaration must be accompanied by a petition addressed to the Minister, and supported by a certificate of birth and a certificate of good conduct from the head of the establishment in which the candidate has completed his last year of studies, or, in default of this, by the mayor of his last place of residence.

Admission to the school can only be obtained by means of competitive examination (*concours*).

The examination is public, in as far as it is oral; it takes place in Paris every year, in two distinct sessions, between which the candidate may choose.

The tests consist in written compositions, and in oral examinations, bearing upon the following subjects :—

1. French language.
2. Arithmetic.
3. Elementary geometry.
4. Algebra, as far as the general theory of equations, exclusively.
5. Rectilinear trigonometry.
6. Analytical geometry.
7. Descriptive geometry, as far as left surfaces, exclusively.
8. All those parts of physics which precede the theory of heat in the lycées.
9. In chemistry, the general principles and the metalloïds.
10. Natural history.
11. Drawing, free-hand and linear, and washing in.

All the matters comprised in the detailed programme are equally obligatory. Candidates whose knowledge of any one of these subjects is considered insufficient, cannot be admitted.

The written compositions may have reference to all the divisions of the programme; correct and methodical writing, as well as a regular and very legible handwriting are essential conditions. The candidate must, besides, execute, under *surveillance*, a diagram (*épure*) in descriptive geometry, and an architectural design, including ornamental parts, which the candidate must draw on a reduced scale, after a model drawing. Some part of this drawing should be washed in in pale tints.

The oral examinations follow the written compositions.

All candidates must prove that they have filled their seventeenth year previously to the 1st of January of the year in which they present themselves for examination, and must produce certificates of vaccination and of good conduct.

The expenses connected with the examination are defrayed by the school, and candidates have nothing to pay.

After the conclusion of the *concours*, the list of the pupils to be admitted is definitively fixed by the Minister on the proposal of the School Council.

School of Watchmaking at Cluses (Haute Savoie).

Extracts from the Decree of Organization of 30th November, 1865.

The object of the school is:—

1st. To train workmen for the manufacture of the different parts of watches.

2nd. To procure the necessary instruction for those who are destined to be repairers, or makers of watches.

The school is administered by a director with the concurrence of a council of administration. The director is nominated by the Minister of Agriculture, &c., and chosen from among persons well acquainted with the various branches of the art of watchmaking. His salary is fixed by the Minister.

The council of administration consists of: the prefect, who presides; the *sous-préfet*, who acts as vice-president; the director of the school; a member of the council general of the department, the mayor of Cluses, and two of the principal watchmakers of the *arrondissement*.

The member of the council general and the two watchmakers are nominated every year by the préfet.

The council receives once a year from the director of the school a report of the management, and gives its opinion as to this management; it determines, on the proposal of the director, the division, the hours, and the programmes of the lessons and exercises; it regulates all matters concerning discipline, and order, and improvements to be introduced; lastly, it exercises a constant supervision over the instruction, and should particularly take care that it retain its practical character.

The instruction given in the school is gratuitous, and is both theoretical and practical.

The practical instruction comprises all the methods and operations suited to give to the pupils the manual dexterity necessary for one, or for several of the special parts of watchmaking.

The theoretical instruction comprises the elements of arithmetic, of geometry, and of mechanics. The pupils are besides practised in

making drawings of the various detached parts of a watch, and of the tools used in watchmaking.

The normal duration of the instruction is two years, and in no case can a pupil be allowed to remain more than three years in the school.

The staff of teachers consists of a master, intrusted with the theoretical instruction, and of heads of workshops (*chefs d'atelier*) in number sufficient for the needs of the establishment.

These teachers are all appointed by the prefect, but proposed by the director. Their salaries are fixed by the Minister, who also regulates the number of pupils to be admitted each year.

No child under twelve years of age can be admitted as a pupil. Candidates must produce—

1. A testimonial of good conduct.

2. Must prove by examination that they are in possession of elementary knowledge comprising reading, writing, spelling, and the first four rules of arithmetic.

3. Must produce a certificate of vaccination.

They must on entering the school be provided with a certain number of tools, and must deposit a sum of 25 francs as a guarantee for any losses, or deteriorations caused by their fault.

The pupils are distributed among the different workshops in the school, according to the judgment of the director. The proceeds of the work done in the workshops belong to the State.

The pupils are all day scholars, and are placed by their parents in families domiciled in the commune of Cluses, and approved by the administration of the school.

The administration may, however, at the request of the parents, or for motives of its own, undertake to place the children. In these cases the parents must pay in advance every three months a sum of which the maximum must not exceed 600 francs a year.

A certain number of places in the school are reserved for journeymen watchmakers who wish to perfect themselves in the fabrication of one part or of several parts of the watch works.

The stay of these journeymen in the school must not exceed six months.

Grants (within the limits prescribed annually in the budget) may be made to pupils whose families are in straitened circumstances, and who have merited such aid by their industry and their good conduct. These grants shall be applied to the expenses of their board and lodging, and similar assistance may, under the same circumstances, be afforded to the journeymen admitted temporarily into the school.

The pupils are subject to the supervision of the administrative authorities of the school, not only within its walls, but also when out of doors, or with the families with whom they live.

General examinations take place at the end of each year, in the presence of the director and of several members of the administration. At the conclusion of the examination places according to merit are assigned to the pupils, whose conduct during the whole year, as well as the quality of their work, also influences their position in the class.

Certificates of study are given to pupils of the second year who are judged worthy of receiving them. These certificates indicate the degree of ability attained by the pupil as a watchmaker, with mention of the special part of the watch to which he has particularly devoted himself during his stay in the school.

SWITZERLAND.

Extracts from the School Law of the Canton Aargau, 1865.

Art. 1.

THE administration of all matters connected with education is intrusted, according to the law of organization of the Council of Government, to a Director of Education, assisted by a Council of Education, consisting of six members.

Art. 2.

The members of the Council of Education are nominated by the Council of Government. The Director of Education presides in the Council.

The matters submitted to the deliberation of the Council are:—

1. All laws, ordinances, and regulations relative to education.

2. The introduction and rejection of books, &c., used in the public schools.

3. The organization and plans of study in individual schools.

4. The creation of new schools, the suppression of existing schools, and the dissolution or union of school communities.

5. The appointment and salaries of school teachers, as also of inspectors of public schools.

The Council of Education may invite individual teachers, or other well informed persons, to take part in its deliberations.

Art. 3.

The Council of Education pronounces authoritatively on the following matters, right of appeal to the Council of Government being however reserved.

a. It issues the certificates of capacity for election to the male and female teachers in the public schools, and confirms the election of teachers in the communal and district schools.

b. It gives the certificates of maturity.

c. It appoints the members of the district school councils, and the inspectors of communal schools.

d. It decides in all contentions between teachers and school authorities.

e. It has the right to suspend, after proper investigation, teachers proved to have rendered themselves in any way unworthy of their office, and to propose their dismissal to the Council of Government.

f. It determines all questions as to school buildings.

Art. 4.

Every district shall have a district school council, which superintends and approves the administration of the school property, all matters of accounts and salaries, the building undertakings, the organization of school communities, and the foundation of schools. All cases of disagreement between teachers and authorities are brought before it, and it investigates the complaints arising out of this disagreement, and receives the observations of the inspector relative to these matters, &c., and makes an annual report to the Director of Education.

Art. 7.

All teachers in the public schools are elected for six years, and must at the end of this term be confirmed in their office for another six

years, and so on. The confirmation is pronounced by the Council of Education.

Art. 15.

Teachers whose age and infirmities oblige them to retire from their office, receive an annual allowance, as long as they have no other means of subsistence.

Meritorious teachers who resign for other reasons than age or infirmity, may, if they have not other means of subsistence, receive a grant, the amount of which is determined according to their time of service and to the services performed.

Art. 21.

With exception of the teachers of needlework, all male and female teachers are bound to join the Hargan Association for securing pensions to school teachers.

This association receives a yearly contribution from the State, the application of which sum is determined by the Council of Government, after consultation with the association.

Art. 22.

For the practical improvement of the teachers of the communal schools of each district, conferences have been instituted.

These conferences are directed by a chairman elected by the members. They are held at least four times a year, and attendance is obligatory.

The female needlework teachers also assemble in district conferences, under the presiding of the head governess.

Art. 23.

Each district conference possesses a lending library of educational works, the purchase, use, and administration of which is managed by the members.

This library is supported by the annual subscriptions of the members of the conference, by the fines paid by them for non-attendance, and by a yearly contribution from the Educational Council.

Art. 24.

All the teachers in, and inspectors of the public schools in the canton, together with the chairman of the district conferences, constitute the cantonal conference.

The object of this is to promote the scientific activity of the teachers, and to discuss and bring to the knowledge of the school authorities matters relating to the schools.

This conference assembles at least once a year.

A. Communal Schools.

Art. 25.

Every commune or village situated at a distance of more than half a (Swiss) mile from the nearest school, and which numbers forty children of the age appinted by law for attendance in school, is bound to institute a communal school.

No commune is bound to receive into its school children belonging to another commune.

Articles 26 and 27 determine that under certain conditions, the children of two or more communes may be united in one school, and that a school may leave one union and join another.

Art. 28.

When the number of children in a commune during four successive years, amounts to eighty, a second school must be instituted, and for each increase of eighty in the school population, a new school must be erected.

Art. 29.

When the number of scholars in a commune sinks below sixty, the school may, by order of the Council of Government, be united with another school.

Art. 30.

When a village, on account of too great distance from the nearest school, or on account of the badness of the roads, is obliged to maintain a school of its own, although the number of children bound to attend does not amount to forty, or when it seems more desirable that the children of the school should be removed from one with which they have hitherto been united to another in closer proximity, and the village lack the means required for any of these purposes, the institution and maintenance of suitable arrangements for the education of the children shall be provided by an extraordinary grant from the State, and by a proportionate contribution from the rest of the school community.

As regards such arrangements, and the contributions to be made towards it by the State, the school community, and the village (*Ortschaft*) itself, the Council of Government must lay a special decree before the Great Council.

Art. 31.

If there be no suitable school-house in a place, the school community is bound to see that a proper building be provided, as also to furnish, to heat, and keep it in repair.

Art. 35.

The Council of Governmant gives grants in aid of such buildings, &c., under certain conditions, and in certain relative proportions, but in no single case must the grant exceed 2,500 francs.

Art. 37.

The subjects of instruction in the communal schools are:—Religion, reading, writing, languages, cyphering, measuring, drawing, and singing, besides the practical instruction (*real-unterricht*) contained in the prescribed reading books. In addition to this, bodily exercises shall be introduced into all the schools, and as regards the boys they should have special reference to the future use of arms.

Art. 38.

Determines that the schools shall be divided into schools under one master (*gesammt schulen*), and schools under several teachers (*successiv schulen*), besides the so-called parallel schools, being the same class of school, but for boys and girls separately.

Art. 39.

Fixes the duration of the compulsory education at eight years, during the first six of which the teachers are to aim at imparting a thorough knowledge of the elementary subjects of instruction, whereas the last two years are to comprise a separate course of instruction, in which the practical requirements of life are to be combined with the general subjects of education, and the differences between these requirements, as regards girls and boys, are to be duly attended to.

Arts. 40 and 41.

Determine that every child in the canton which shall have completed its seventh year, shall commence to attend the communal school at the beginning of the next ensuing school term, and shall be bound to continue this attendance during eight years.

That children under the age of seven must not be admitted into the schools; and that children who are suffering under bodily or mental ailments, are exempt from attendance at school; so also those who have teachers at home, or who attend a private school, or one of the higher public schools.

Should these latter conditions cease while the child is still of an age to attend school, it must enter the communal school.

Art. 43.

If a child at the end of the sixth annual course of instruction is in possession of the amount of knowledge required by the regulations of the school, it will be removed into the higher forms, but if it be not competent to be raised into the higher class, it must nevertheless remain in the school till the expiration of the legally appointed eight years.

Children whose parents wish them to enter a higher school, may be withdrawn from the communal school at the end of the sixth year.

Art. 44.

The minimum number of weekly hours of instruction in the communal school is fixed at fifteen, in the summer months, during the first six years, and at twelve during the last two years; in the winter months at eighteen during the first two years, and at twenty-four during the rest of the years.

The girls who are bound to attend the work-schools must in summer attend school at least fifteen hours in the week, and in winter at least seven-and-twenty hours.

The maximum number of hours weekly, during which a teacher is bound to instruct, is seven-and-twenty in summer, and six-and-thirty in winter.

Art. 45.

The communal schools shall be organized exclusively on the basis of the class system.

The instruction in the practical sciences (*real unterricht*) must from the commencement be connected with the instruction in languages, and graduated lessons in the practical sciences must therefore be introduced into the reading books used for the lessons in languages.

Art. 46.

All books and other means of instruction used in the school are to be purchased with the school funds, but each child must subsequently pay back his share of the cost. Poor children, however, receive these things gratuitously, as also the materials, and the instruments used in the work-school.

Art. 49.

In every school community there are work-schools for the girls within the age of compulsory education, and these schools form a part of the communal school, and are subject to the same rules.

Art. 50.

Every girl is bound from the beginning of her third year at school,

and till the end of her school time, to attend the work-school, the work in which embraces: knitting, sewing, the repairing of old clothes, and the making of simple articles of wearing apparel. The teacher is moreover strictly enjoined to see that the girls acquire habits of cleanliness, order, and economy. Fancy work must not be taught until the scholars have attained proficiency in the more ordinary kinds of work.

Art. 52.

Every community must produce, in addition to the salary of the teacher, suitable and separate premises for the work-school, and must undertake to keep it warm.

In cases of necessity the State grants a contribution to the teacher's salary, but never exceeding one-half of the salary.

Art. 54.

When one or more school communities wish to erect, in addition to the obligatory communal schools, a perfecting school (*Fortbildungs schule*), the principles by which they are to be guided, are as follows:—

a. The school must consist of two or three classes, each with a course of one year's duration. Admission into the school is allowed after an examination, and at the end of the fifth, or when the school has only two classes, at the end of the sixth year of the school time.

b. The subjects of instruction shall be the same as in the upper classes of the communal school, but taught more extensively, and with particular reference to the requirements of farmers, craftsmen, and tradesmen. In addition the French language must be taught.

c. The number of hours of instruction weekly must in summer be at least eighteen, and at most twenty-four, and in winter at least four-and-twenty, exclusive of the lessons in needlework for the girls.

Special branches of instruction may be intrusted to assistant teachers.

Art. 55.

If the expenses connected with the foundation of a perfecting school, have to be raised by a voluntary rate imposed by the commune on itself, the State gives a grant of 1,000 francs once for all.

Factory Schools.

Art. 59.

Every manufacturer who employs children, and who does not send them to the ordinary communal school, is bound, either alone, or in conjunction with other manufacturers, to erect a factory school, under a properly appointed and certificated male teacher, and a female teacher for needlework, which school, all the children in the factory must attend.

Art. 60.

The factory school must be organized like the two upper classes in the communal school, and must embrace the same subjects of instruction; and with it must be embraced a work school for the girls suitable to the degree of efficiency which they have attained.

Art. 61.

Instruction must be given separately in the two classes, and during twelve hours weekly in each.

Art. 62.

Determines that the entire expenditure connected with factory schools must be borne by the manufacturer, and that for no purpose whatsoever, in connection with the school, must any deduction be made from the wages of the children, nor must any school fee be demanded of them.

Art. 63.

The factory schools belong to the class of communal schools, and are subject to the same laws and regulations.

Infant Schools.

Art. 64.

The object of the infant schools is to secure to children who have not yet attained the age fixed for compulsory attendance in school, undisturbed mental and bodily development according to the laws of nature. The principles to be followed will de laid down in the regulations.

Art. 65.

The infant schools are under the direction and inspection of the ordinary school authorities, but attendance is not compulsory.

Private Instruction.

Art. 67.

As an exception to Art. 40, parents and guardians, instead of sending their children, or those confided to their care, to the communal school, may undertake to educate them themselves or to have them taught at home by tutors and governesses, or may send them to private schools, but in each case the demands contained in the regulations concerning public instruction must be satisfied.

Whoever, therefore, wishes to avail himself of this exceptional privilege, must give notice thereof to the school guardians, who in their turn must inform the communal schoolmaster and the inspector on the subject.

Children who are instructed at home must submit to the annual examination in the communal school, and private schools are annually subjected to a public examination.

Only certificated teachers can be allowed to give instruction in private schools.

Art. 68.

If it be proved that in spite of repeated remonstrances children are instructed in a faulty or negligent manner, or that the teachers employed are not competent, the inspectors shall take care that the parents or guardians send the children to the public communal school.

School Fees.

School children, whose parents are not rateable in the commune in which they live, or whose property is rated in another commune, pay a school fee, not to exceed five francs half yearly, or, in case of indigence, not to exceed one franc.

Enforcement of Attendance in School.

Art. 70.

Previous to the commencement of each school year the communal

council and the authorities of the parish (*der Pfarramt*), must deliver to the school guardians (*Schulpflege*) a list of all the children coming within the law of attendance in school, and the guardians shall supply the inspector with a duplicate list.

If children within the legal age remove into a commune during the course of a school year, the communal council and the school guardians must take care that these also begin at once to attend school.

Art. 71.

No child who has begun to attend school can be allowed to absent himself during single hours or days, or during a longer time, without permission or without giving valid reasons.

Only sickness, and the urgent cases mentioned in the regulations, can be received as valid reasons, and they must be stated and proved within a delay of one week.

Art. 72.

Every schoolmaster must keep a list of the children bound to attend his school, in which he must enter their absence and the reasons given for it each half day.

Absence during the instruction of half a day constitutes an offence.

The list of absences must be laid before the school guardians in their regular monthly meetings, and a copy must likewise be sent to the inspector.

If children repeatedly neglect any particular lesson, this must also be marked in the list of absences.

Art. 73.

Absences which have not within a week been satisfactorily accounted for, shall be considered as not accounted for.

For every such absence the parents or guardians of the offending child shall, within a week after the delivery of the list of absences, be called to account, and punished according to circumstances.

The school guardians must not, during the summer school, punish one child more than six times in a month for culpable absence from school, and not more than twelve times in the course of the six months, and during the winter school not more than six times in one month, and not more than fifteen times in the six months.

If the culpable absences of a child during a half year exceed the number mentioned, the guardians must every month give notice to the president of the district court of the number in excess, in order that he may pronounce the penalty of the infliction of which he shall subsequently inform the guardians.

In cases of first offences of the kind, the guardians may punish any, not exceeding three in a month, with a reprimand only.

Art. 74.

The guardians shall inflict for every culpable absence of half a day a fine of from 20 to 60 rappen, and, in case of inability to pay, with imprisonment within the commune, but the president of the district court may inflict fines of from 70 rappen to 2 francs, and, in cases of inability to pay, may pronounce sentence of imprisonment in the chief place of the district.

The fines are levied by the school guardians, the sentences of imprisonment pronounced by the guardians are carried out by the communal police officer, and those pronounced by the district judge are enforced by the district authorities.

Persevering absences from school shall be punished according to articles 213, 327, and 380 of the civil law.

The fines levied by the school guardians are paid into the communal school treasury.

Art. 76.

Fixes the penalties incurred by the school and other authorities for non-performance of their duties with reference to these matters.

Competency of the Teachers for Election.

Arts. 77, 78, and 79

Determine the conditions under which candidates may obtain certificates pronouncing them to be competent for election as schoolmasters and teachers.

Art. 80.

Teachers in the communal schools are elected by the school community, on the joint proposal of the school guardians and the communal council.

Art. 81.

Definitely appointed teachers in the lower classes of the communal schools shall receive an annual salary of at least 800 francs, and in the upper classes of at least 900 francs. In the perfecting schools with two classes, the salary shall be 1,200 francs, and in those with three classes, 1,500 francs.

After ten years' satisfactory service, the teacher shall enjoy a yearly addition of 50 francs, and after fifteen years' satisfactory service, a further proportional increase. In case of inability of the commune to pay these additions out of the funds mentioned in articles 88 and 89, the State will give a grant in aid.

A definitively appointed teacher in the work school shall receive a yearly salary of 100 francs, to be paid out of the school fund.

The State grants in aid of salaries shall in no case exceed one-half of the amount of the salary; the other half must therefore be provided by the commune.

Art. 83.

Poor communes, which prove that they are unable to provide the minimum required of them for the support of the schoolmasters, shall receive from the State a special annual grant in aid of 100 francs for each.

School Property and its Administration.

Art. 85.

In every commune which has a school of its own, the school property is kept distinct from the property of the commune, the church, and the poor law authorities, and is accounted for separately.

Art. 86.

The communal school property consists of capital and real estate, acquired during past years.

The sources which contribute to the constant increase of this property are:—

a. Marriage fees.

b. Half of the fees for churching women

c. Half of the licence tax.

d. Certain proportions, fixed by law, of the legacy duties.

e. Voluntary gifts and bequests.

f. A certain share, approved by the Council of Government, of revenues, and funds belonging to the commune, in excess of expenditure.

Art. 88.

The revenues of each communal school are derived from the following sources :—

a. The interest on the school property.

b. The legal school fees.

c. The fines paid for non-attendance.

d. The rents of the school glebe which is let.

e. Other revenues assigned to the schools.

f. Finally, the annual contributions, which, either in accordance with contract, or with tradition, are paid to the schools out of the property of the church, or of the corporation, as long as this property has not been divided, and the portion allotted to the school has not been paid out.

Art. 89.

When the revenues do not suffice to cover the annual expenses of the school, the income is further supplemented by—

a. Extraordinary contributions from other communal treasuries.

b. Rates to be levied according to law, and

c. The State grants in aid of the teachers' salary.

Art. 90.

The school treasury bears the charges of all the ordinary and regular expenses of the school, viz. :—

a. The purchase of books and all other materials of instruction required in the school.

b. The salaries of teachers.

c. Heating the school and keeping it clean, and in ordinary repair.

d. The provisional outlay for the purchase of school materials wanted by the scholars.

B. District Schools.

Art. 107.

The object of the district school is to widen the culture obtained in the communal school, and to lay the foundation of the professional knowledge required on leaving school, as also to prepare pupils for the higher cantonal schools.

Art. 108.

The instruction given in the district school is, as a rule, imparted in four yearly courses, and by at least two principal masters, and the necessary number of assistant teachers.

Art. 109.

The subjects taught in the district school are :—Religion, the German and French languages, arithmetic and geometry, in connexion with practical exercises, general and Swiss history and geography, natural history and philosophy (*naturkunde*), introduction to book-keeping, writing, drawing, singing, gymnastics, and miltiary exercises.

If the means of the school allow of it, instrumental music also may be included among the subjects of instruction.

The regulations define which of the subjects are obligatory.

Art. 110.

Instruction in the Latin, Greek, Italian, and English languages cannot be taught in schools with less than four principal teachers, and two of these languages not in schools with less than three principal teachers.

Art. 111.

The age of admission into the district school is after eleven years, and only those are admitted who prove themselves to be in possession of an amount of knowledge to be determined by the regulations.

Art. 112.

In communes which have no perfecting schools, girls also may be admitted into the district schools, but shall take part only in those branches of instruction which shall be deemed suitable for them.

Art. 114.

The district schools are founded, with the aid of the State, either by the communes exclusively, or by communes and private persons in conjunction.

Art. 120.

All the provisions of the law relative to attendance in the communal schools apply equally to the district schools.

Art. 121.

A school fee of 20 francs at the highest shall be paid for attendance in the district school; but if the parents of the scholar be not rateable in the school union, the fee may be raised to 24 francs, in case they are Swiss citizens, and to 32 francs in case they are foreigners.

Poor scholars may be exempted from the payment of these fees.

C. Canton Schools.

Art. 139.

In accordance with the two principal directions of higher culture, the canton schools are divided into gymnasiums and industrial schools.

In the organization of these schools, provision shall be made for the education of district schoolmasters.

Gymnasiums.

Art. 140.

The object of the gymnasium is to prepare scholars, who desire to devote themselves to the learned professions, for the high school.

Art. 114.

The gymnasium consists of four classes, each with a course of one year.

The subjects taught are:—Religion, the German language and literature, Latin, Greek, the French language and literature, geography, history, mathematics, natural science, drawing, singing, instrumental music, gymnastics, and military exercises.

In addition to this, future students of theology may receive instruction in Hebrew.

II. *Industrial Schools.*

Art. 145.

The object of the industrial school is to give to those scholars who wish to devote themselves to industry, commerce, or the technical professions, in addition to more extensive general culture, the special knowledge and skill required for these careers, and for admission into the federal polytechnic school.

Art. 146.

The industrial school consists of three classes, each with a course of one year, and of a fourth class with a half-yearly course, which may, when necessary, be extended over a whole year.

Art. 147.

The subjects of instruction in the industrial school are:—Religion, the German language and literature, the French language and literature, the English and Italian languages, geography and history, commercial arithmetic and bookkeeping, pure and applied mathematics, natural history and physics, chemistry and practical exercises in the laboratory, technical drawing and artistic drawing, singing, instrumental music, caligraphy, gymnastics, and military exercises.

Art. 149.

Scholars in the canton schools pay a school fee, the amount of which is regulated according to various circumstances.

The age of admissisn is fifteen, and a certain amount of preliminary knowledge is required.

Poor scholars may be exempted, by the educational direction, from payment of the fees.*

Industrial Schools in the Canton Neuchatel. (*Extracts from the Law on the subject.*)

The Great Council of the Canton having taken into consideration that the system of primary instruction organized by the law of 20th March, 1850, did not suffice for the wants of certain localities, and that the respective local authorities had, in consequence, begun to devise means within the limits of their resources, for meeting the existing deficiencies, decreed, in 1853, the institution of a system of secondary instruction, to be called Industrial Schools, and the object of which is to impart to children of both sexes a more extended education than that given in the primary schools, as also such special knowledge as may be directly applicable to the commercial, artistic, and industrial professions.

The expenses of these establishments are covered.

(*a.*) By the school fees;

(*b.*) By an annual subsidy from the commune or the municipality;

* The guiding principles, the organization, and the direction of the educational systems in the Cantons Thurgan, Zürich, St. Gallen, and Ticino, are in all essentials similar to the above, and the same seems to be the case as to the Cantons of Bern and Neuchatel, and the Pays de Vaud.—Trans.

(*c.*) By an annual allowance from the State, calculated according to the number of scholars, of masters, and of special subjects of instruction requiring special teachers. The part charged to the State may be as much as half the amount of the salaries of the schoolmasters and teachers, but the annual sum allowed to one individual school, comprising the girls' division, must in no case exceed 5,000 frs.;

(*d.*) Where the case may be, by the interest of the capital possessed by the school, or by special donations.

The subsidies of the State and of the municipalities vary according to the exigencies of the annual budget of the schools.

The administration of these industrial schools is under the local committees of education instituted by the law of 1850, and is carried on conformably to the laws and regulations, under the inspection of the Superior Council of State.

The subjects of instruction are—

A.—*In the Boys' Schools.*

1. French language (the art of reading aloud, reading with argumentation, and exercises in grammar; exercises in recitation and readiness of speech; exercises in composition).

2. French literature (analysis of divers kinds of literary compositions; study of the principal writers of the principal epochs in French literature).

3. German language, and in some cases English language (grammar, exercises in translation, conversation and composition, and reading of selections from the literatures of the languages).

4. Geography (essentially political and commercial); cosmography.

5. History (general chronology; mediæval and modern history).

6. Civic instruction (rights and duties of citizens, federal and cantonal institutions, elementary notions of cantonal legislation).

7. Mathematics (repetition of arithmetic; elementary algebra; geometry, measurement, and levelling; rectilinear trigonometry; elements of descriptive geometry; applied mathematics; statics and dynamics; elementary study of machinery, and especially of such as is employed in the principal branches of industry in the country).

8. Bookkeeping.

9. Physical and natural sciences, with application to arts and industry (general physics; inorganic and organic chemistry; the ordinary substances and compounds of industry; general notions of geology, mineralogy, zoology, and botany).

10. Geometric and artistic drawing; modelling, applied to arts and industry.

11. Vocal music.

12. Gymnastics.

To these regular courses may, on the proposal of the Educational Committee, be added others not mentioned in the programme.

B.—*For the Girls' Schools.*

The programme is the same as in the boys' schools, deduction being made of civic instruction and mathematics, and with the exception of certain modifications in the courses generally.

On the other hand, lessons in the art of teaching, and in domestic economy, may be added to the programme in the girls' schools.

The pupils may be either boarders or day scholars; and admission is only granted after the satisfactory passing of an examination in all the branches constituting primary instruction.

Two permanent masters, at least, must be attached to each of the industrial schools, and they give the lessons in the girls' school as well as the boys' school; but female *surveillantes* attached to the establishment are present at all the lessons in the former, and also help the pupils in their preparation for the lessons.

Communes and municipalities which desire the institution of an industrial school in the locality, must bind themselves to provide the required subsidy, and must also provide the necessary school houses or rooms.

The Committees of Education give notice when the development of the school render it necessary, that the following auxiliary means of instruction should be provided.

(*a.*) A library.

(*b.*) A cabinet of physical instruments; of machinery required for instruction in technology and mechanics.

(*c.*) A chemical laboratory.

(*d.*) A studio for drawing and designing.

(*e.*) Collections to be used in the lessons in the natural sciences.

(*f.*) A covered and warm *locale* for the lessons in gymnastics.

No person can exercise the function of teacher in these schools who does not possess a certificate of capacity.

In order to facilitate the establishment and the success of industrial schools, the Educational Committees are authorized to include evening hours in the lesson plans, should local circumstances render this desirable; to make arrangements with neighbouring localities for the admission of scholars, or for the same master to give a course of instruction in two different localities; or to found industrial schools for boys only. All these arrangements must be submitted for approval to the Council of State.

Special School of Industry, Public Works, and Civil Engineering for French Switzerland. Founded in Lausanne in 1853.

THE school receives a subsidy from the Vaudois Government, and from the commune of Lausanne. The direction is vested in an administrative council, consisting of a president, a vice-president, four other members, and a secretary.

The studies are placed under the immediate superintendence of a council presided over by the director of the school.

The object of the school is to form civil engineers, mechanical engineers, chemical engineers (*ingénieurs chémistes*), and architects. It is organized so as to afford to young men destined for any one of these professions all the theoretical and practical knowledge required. The studies extend over three years.

Candidates seeking admission may be at least full seventeen years of age, and must submit to a preliminary examination, divided into two parts, one oral and one written.

Two scholarships (*bourses*), amounting together to 1,000 francs, have been founded by the commune of Lausanne for the benefit of young men in straitened circumstances. A free place is also offered by the school to young men belonging to families who have not been favoured by fortune.

The two scholarships and the free place are given in accordance with the results of a competitive examination.

Programme of the Course.

First Year.

1. *Geometrical Analysis and Infinitessimal Calculus.*

Recapitulation of rectilinear trigonometry, and application of it to the resolution of problems. Reduction of the angle to the horizon. Reduction of the angle to the centre of the station. The most important formulas of spherical trigonometry. Their application to the resolution of divers cases of the triedric angle (*l'angle trièdre*). Projection of polygonal outlines on an axis. Plane and solid co-ordinates.

Representation of geometric points (*lieux*) by equations. Geometric point of one equation with two variables. Equation of the straight line. Lines of the second degree. Properties of the ellipse, the hyperbola, and the parabola. Simpson's formulas for calculating the areas of plane surfaces.

Differentiation of the explicit and implicit functions of a single variable. Relations of the increase of two functions of the same variable. Finding of the true values of unknown quantities. Maxima and minima of the functions of a single variable.

Immediate integration. Integration by decomposition. Integration by substitution. Definite integrals. Quadrature of surfaces. Rectification of curves. Curves of revolution of solids.

The pupils should be well practised in calculation.

Theoretical Mechanics.

Movement of a geometric point.

Graphic representation of the general equations of this movement. Motion of invariable systems. Composition of motions and velocities. Relative motion. Measure of forces. Impulsion of forces. Application of forces (*travail des forces*). Mass of bodies. Movement of a material point. Composition and decomposition of forces applied to a material point. Motion of a material point moving with initial velocity, and subjected to the action of some force or other. Tangential and centripetal forces. Apparent forces in the relative movement of a material point. Composition of forces applied to a rigid system. Couples (*couples*). Motion of forces. Centre of gravity. Geometric and mechanical properties of this point. Equilibrium of forces applied to a rigid system. Friction. Calculation of amount of friction in some simple machines. Resistance of the air to the movement of a body.

Descriptive Geometry.

Revision of the straight line and the plane by the method of orthogonal projections. The straight line and the plane by the method of numbered plans.

Surfaces in general; regulated surfaces; developable surfaces or left surfaces; surfaces of revolution. Of the plane tangent to diverse surfaces when the point of contact is given. Intersection of surfaces and delineation of the tangents to the curves.

Of left surfaces in general. Of planes tangent to surfaces when the point of contact is not given.

General Physics.

This course comprises special elucidation of subjects bearing upon industry, such as barometry, thermometry, calculations relative to

dilatation, elastic forces and the total amounts of caloric in steam. (*chaleurs totales des vapeurs*). Formulas of radiation. Mechanical equivalents of heat, of electricity, of chemical action, &c. &c. Meteorology, &c.

General Chemistry.

Study of the principal simple substances useful in arts and industry, and of their principal inorganic and organic constituents. Course of analytical chemistry.

The pupils should be frequently exercised in chemical operations under the direction of the professor.

Industrial Mechanics.

Diverse materials employed in the construction of machinery. Principal component parts (*organes*), and joints. *Cinématique.* Organization of workshops for machine building. Mechanical tools. Spinning machines. Accessories of generators, &c. Instruction in making plans of machines and of buildings.

Building.

Of the materials used in building. Of their preservation. Manufacture of bricks and tiles, of mortar, of hydraulic and non-hydraulic mortars, and of cements. Plastering. Details of masonry in general. Making plans and levelling.

Graphic Studies.

Ornamental designs, done with the pen. Architectural drawing. Exercises in washing in colours. Conventional tints. Machine designing. Diagrams (*épures*) in descriptive geometry. Topography.

Work during the Vacations.

The pupils must execute plans of buildings, of machines, and of industrial structures, and write a description of them.

These obligatory exercises must be delivered in on the day when the school again reassembles, or they will be considered as not finished.

SECOND YEAR.

Special Course.

Analytical Geometry and Infinitessimal Calculus.

Recapitulation of the studies of the first year, with numerous exercises in calculation.

Straight lines and planes. Surfaces of the second degree. Principal properties of these surfaces, deducted from their equations.

Differentiation of the functions of several independent variables. Taylor's series for the functions of a single variable. Equations of the tangents and normals of curved planes. Length of the tangent, of the sub-tangent, of the normal, and of the sub-normal. Asymptotes. Concavity and convexity of curved planes. Single points. Curves of plain lines. Osculatory curves.

Elements of the differential calculus and its applications to interpolation.

Theoretic Mechanics.

General theorems relative to the quantity of momenta, velocities, and masses. The point of inertia and the radius of gyration. The shock of bodies.

Theory of the resistance of materials.

Hydrostatics. Calculation of the pressure of liquids and of gases.

Hydraulics. Movements of liquids and of gases. Calculation of the principal hydraulic receivers.

Calculation of the power of steam engines.

Descriptive Geometry.

Rapid recapitulation of the course of the preceding year. Delineation of shadows and perspectives. Cutting of stones, and of timber for building purposes.

Industrial Mechanics.

Metallurgy of iron. Machines and apparatus used in metallurgic works.

Calculation of the proportions of the parts of machines.

Iron bridges and frame work. Roofings (*combles*).

Industrial Physics.

Manufacture of gas for lighting, from coal, from peat, from oils, from water, &c.

Purification. Tubes. Burners.

Measure of the lighting power.

Oil lamps, petroleum lamps.

Electric light, Drummond's light, magnesium light, &c.

Applied Chemistry.

Work in the laboratory, bearing on the analysis and study of various questions.

Architecture.

I. History of the art of building: Egyptian, Greek, and Roman Art, Latin, Byzantine, and Moorish Architecture of the 11th and the 16th centuries.

Architecture of the *Renaissance* in Italy, France, and Germany.

II. *Elements of Edifices.*

Structures in stone: walls, buttresses, orders of architecture and arcades, vaults, doors and windows, staircases.

Structures in wood: roofings, floors, pannelling, joiners' work, &c.

Constructions in iron: locksmiths' work of a coarser and finer kind.

Diverse constructions. On the different modes of covering in buildings, on the distribution of water, &c. Graphic exercises in composition.

HYDRAULIC WORKS.

1st Part. *Agricultural Hydraulics.*

General considerations as to agriculture, elements of vegetable physiology. Arable lands. Cultivation and fallows. Manures and improvements. The management of water from an agricultural point of view.

Examination of torrents. Works proposed for the prevention of inundations. Embankment of watercourses, and improvement of the beds of rivers. Drainage, irrigation.

Search for springs. Artesian wells. Conduits for supplying water in towns. Filters and reservoirs. Fountains, &c.

2nd Part. *Internal Navigation.*

Navigable watercourses, and such as are suitable for floatage. Works necessary for the establishment and the improvement of navigation.

Artificial navigation, lateral and other canals, reservoirs, trenches for conveying water, sluices, &c.

Roads.

Ordinary roads and railways. Delineations. Building, and keeping in repair these means of communication.

Geology.

Physical geography.

Graphic studies.

Geometrical plans. Mechanical and architectural drawing. Tinting. Graduated plans.

Work during the Vacations.

The pupils should visit workshops, finished buildings, or buildings in course of construction, and should closely observe the progress of the work. When the school meets again they are bound to deliver in a written account of what they have seen, accompanied by exact drawings or sketches, and by all the notes on which their account is based. These notes should be regularly classified, and be neatly written.

THIRD YEAR.

(Special Course.)—Architecture.

I. *On Composition.*

Distribution, salubrity, solidity.

Beauty of proportions, of decorations, and of style.

II. *Study of various Modern Monuments, Halls,* market buildings, workshops, divers industrial buildings.

Bridges, aqueducts, viaducts, lighthouses, railway buildings.

Town and country houses.

Prisons, hospitals, public baths, &c.

Schools, libraries, and museums.

Theatres, concert-rooms, and circuses.

Religious structures and funeral monuments.

On the laying out and enlargement of towns.

Graphic exercises in composition.

Construction.

Foundation works of all kinds, and in all sorts of ground. Description of the various systems in use. Calculation of the supporting walls and the vaults. Stone and wooden bridges. Suspension bridges.

HYDRAULIC WORKS.

Harbours.

Harbours on rivers, lakes, and sea. Conditions of the establishment of a good harbour. Outer works and inner works, such as—roads, bars, breakwaters, piers, jetties, quays, &c. Floating basins, docks, &c.

Maintenance of harbours: cleansing, works for building and repairing ships; careening docks, &c. Lighting of coasts and ports. Lighthouses, harbour lights.

Discussion of divers plans of ports.

A Course of Law.

(In as far as it is required by the Engineer.)

General principles of civil law and administration. More extensive development of certain parts, such as distinction between various kinds of property; administration of public domains; the rights of property and their limits; dangerous industrial establishments; expropriation for public use; mining legislation; increase of property by accession: usufruct; legislation as to roads and railways, water supply, drainage, watercourses, irrigation, workshops, manufactories; boundaries, plans, and registers of lands; general rules of contracts; sales, rentings, hirings, workmen, and carters; estimates and bargains; undertaking of public works; civil and commercial associations; loans and commercial effects; agents and brokers; transactions; privileges and hypothecation; prescription, &c., &c.

SECOND AND THIRD YEARS.

These *cours*, divided into two sections, under the designations A and B, are delivered to the united pupils of the second and third years. Each section is given alternately every second year.

Industrial Mechanics.

Section A.

Means used for the transport and lifting of heavy burdens: rollers, winches, cranes, &c. Management of mines: means and processes adopted.

Hydraulics: construction and placing of wheels and turbines. Machines for raising water. Study of pumps. Raising of water, exhaustion (*épuisements*). Hydraulic presses. Apparatus for ventilation. Windmills. Agricultural machines. Mechanical saw works, &c.

Section B.

Steam-engines. Thorough study of these machines: calculations, construction, fixing. Steam boilers. Attempts to introduce improvements in steam-engines—diverse inventions.

Use of steam in industry. Railways: locomotives and rolling stock. Steam navigation: types of marine engines and boilers. Recent progress in naval architecture, &c.

Industrial Physics.

Section A.

Combustion.—Reduced heat, radiated heat.

Combustibles.—Quality, extraction, purification, carbonization. Caloric power, volumes of air, temperature, cost price. Testing of combustibles.

Furnaces.—Smoke consuming furnaces; furnaces of particular construction; gas furnaces.

Movements of the Air.—Formulas of draught (*formules de tirage*) for the chimneys of forges, &c.; chimneys common to several furnaces. Construction of chimneys. Mechanical attraction (*appel mécanique*) of the air. Resistance of the conduits.

Transmission of Heat.—Laws of transmission in diverse cases. Laws of refrigeration. Application of these to heating in general.

Heating and Ventilation of public buildings and private dwelling-houses.

Production of Cold.—Fabrication and conservation of ice. Glaciers.

Section B.

Distillation.—Simple, composite, under diverse degrees of pressure, with multiple use of heat.

Evaporation.—Spontaneous in dry air by means of direct heat, by means of steam heating.

Drying.—In cold air, in hot air, by radiation by mechanical means. Drying apparatus for combustibles, for pulverescent materials, for textile fabrics, &c. Useful effects of the heat in respect of these various apparatus, and at diverse temperatures.

Heating of Air.—Chimneys in dwelling-houses, stoves, hot air, hot water, and steam pipes.

Heating of Liquids.—Baths, washhouses, machines for domestic purposes.

Heating of solid Substances.—Machines for continuous heat, machines for over-heated steam, machines for high temperatures.

INDUSTRIAL CHEMISTRY.

Section A.

Fabrication or extraction of sulphuric, chlorohydric, and azotic acids, of marine salts, of soda, potassium and saltpetre. Glass manufactories and potteries.

Metallurgy of iron and of the other most important metals.

Section B.

Manufacture of sugar, beer, alcohol, soaps, and fatty acids. Conservation of alimentary substances and of woods. Bleaching and preparation of linens, cottons, wools, and silks. Manufacture of paper. Principles of dyeing. Tanning and dressing skins. Chemical operations.

GEOLOGY AND MINERALOGY.

Section A. *Geology.*

General structure of the globe. Phenomena of the surface. Volcanoes.

Sedimentary Rocks.—Stratification. Epochs. Characteristic fossils. Coal fields. Lignites. Gypsums. Mineral salts.

Igneous Rocks.—Form, age, and composition of these rocks. General classification. Metamorphic rocks.

Building materials of these different formations. Chalks and clays.

Section B. *Mineralogy.*

Physical properties of minerals. Crystallography. Study of the most important minerals. Mineralogical study of rocks.

Distribution of metals. Veins of different formations. General laws. Metals in alluvion.

Explorations of mines, and general principles of working and management.

Plans.

The pupils of the third year shall execute, from programmes prepared by the professors, and within a certain delay, numerous plans for undertakings in connection with the special branch of science which they have selected.

These plans are examined, and their merits determined, in a conference presided over by the professor of the special branch in question.

Examinations.

During the three years of attendance at school, the pupils are subjected to partial examinations, and, at the end of the first two years, to general examinations.

All the *cours* are equally obligatory on the pupils, whatever may be the special branch which they have selected as their future vocation.

Competitive Examinations.

At the end of the third year the pupils pass a competitive examination for the purpose of obtaining *a diploma of engineer.*

Superior Industrial School for Girls in Lausanne.

The school is composed of three divisions. The subjects of instruction are:

a. Religion.
b. French language.
c. German language.
d. Physical, political, and commercial geography.
e. General history and history of Switzerland.
f. Arithmetic and bookkeeping.
g. Knowledge of the globes.
h. Botany, zoology, and geology.
i. Writing.
k. Drawing.
l. Music.
m. Needlework and domestic economy.
n. Gymnastics.

The studies are distributed over the three divisions of the school, according to regulations adopted by the municipality, and approved by the Council of Public Instruction.

The lessons (with the exception of the specially feminine branches) are all given by masters; the governesses attached to the school performing merely the functions of supervision, and helping the pupils to prepare for the lessons, and giving instruction in needlework and domestic economy.

No pupil is admitted under twelve years of age, or without passing a preliminary examination, which varies according to the division into which she desires to enter.

The annual fee paid to the municipality by regular pupils (who are all boarders) is 40 francs, but girls belonging to indigent families may be exempted from this payment. Day scholars, who merely attend the classes, pay 10 francs for an annual course of from one to three lessons weekly, and 15 francs for a course in which the number of lessons per week exceeds three. However, the total sum paid must in no case exceed 50 francs.

Persons above the age of twenty may be admitted to attend the lectures, under the name of auditors, and pay the same as the day scholars.

Swiss Federal Polytechnic School.

This school is divided into :—

1. A school of architecture.
2. A school of civil engineering.
3. A school of mechanics.
4. A school of chemistry.
5. A school of sciences connected with the management of forests.
6. A normal school of mathematical and physical sciences.
7. A school of belles lettres and of moral and political science.
8. A preparatory course of mathematics.

The complete course of instruction embraces obligatory branches and non-obligatory lectures.

The instruction shall be given in one of the three national languages (French, German, Italian) according as the professors may choose.

In the instruction given, the Professors must never lose sight of the particular needs of Switzerland.

Article V of the Regulations determines that the course of study in the *School of Architecture* shall extend at least over *three* years, and shall comprise the following subjects : —

Differential and integral calculus.
Descriptive geometry.
Stone cutting and perspective.
Mechanics.
Physics applied to industry.
Petrography.
Chemical technology of building materials.
Ornamental drawing.
Figure drawing.
Landscape drawing.
Architectural drawing.
Modelling.
Comparative architecture and the history of architecture.
Exercises in composition.
Practical exercises in masonry and carpentering.
Bridges and roads.
History of art.
Civil and administrative law.

2. The course of study in the *School of Civil Engineering* shall extend over at least *three* years; and shall comprise the following subjects :—

Differential and integral calculus.
Solid geometry.
Descriptive geometry.
Stone-cutting and perspective.
Statics exemplified by drawings (*Statique graphique*).
Technology and description of the component parts of machinery.
Physics, as applicable to industry.
Petrography.
Chemical technology of materials for building.
Geology.
Topography.
Geodesy.
Astronomical exercises at the observatory.
Plan drawing.
Surveying.
Masonry and carpentering.

Earthworks, roads, railways, tunnels, hydraulic constructions, and bridges, and practical exercise in construction.

Administrative law.

3. The course of instruction in the *Mechanical Industrial School* shall extend over at least three years, and shall comprise the following subjects:—

Integral and differential calculus, with applications.
Analytical geometry.
Descriptive geometry.
Stone-cutting.
Industrial physics.
Technology of machinery.
Analytical mechanics.
Theory of machinery.
Fixing (*établissement*) of machinery, with practise in construction.
Ordinary building (*construction civile*) and exercises.
Metallurgy.
Chemical technology of building materials.
Mechanical technology.
Construction of iron bridges and railways.

4. The course of instruction in the *school of chemistry* shall extend over *two* years at least, as regards industrial chemistry. It embraces the following subjects:—

Inorganic chemistry.
Organic chemistry.
Analytical chemistry.
Practical exercises in analysis.
Chemical technology.
Exercises in the above.
Technology and description of machines.
Chrystallography.
Mineralogy.
Geology.
General, agricultural, and industrial botany.
Zoology.
Industrial drawing.

The instruction in chemistry for pharmaceutical students extends over *three half years* at least, and comprises the following subjects:—

Experimental inorganic chemistry.
Organic chemistry.
Analytical chemistry.
Practical exercises in analysis.
Manufacture of chemical products.
Metallurgy.
Exercises in chemical technology.
Pharmaceutical chemistry.
Experimental physics.
Mineralogy.
Geology.
Botany, general, special, and pharmaceutical.
Zoology.
Pharmacognosy.

5. The duration of the course of instruction in the *school of sciences relating to the management of forests*, is *two* years at least, and comprises the following subjects:—

Mathematics suitable for persons having the management of forests.

Encyclopædia of the science of forest culture (*Encyclopedie de la science forestière*).

Preservation of forests.

Management of forests.

Statistics of forests.

Cultivation of forests.

The art of directing the planting, tending, cutting down, &c. of forests.

Financial management of forests.

Forests belonging to the State dominions.

Cosmography.

Excursions into the forests and valuations made on the spot.

Forest laws.

Topography.

Plan drawing.

Surveying.

Road building, and hydraulic works.

General and agricultural botany.

Entomology of forests.

Petrography.

Geology.

Agricultural chemistry.

6. The course of instruction in the *Normal School* extends over *two* years at least, as regards the students, who mean to devote themselves to the teaching of physical sciences; and over *three* years as regards those who intend to devote themselves to the study of the mathematical sciences.

The students of the first category follow the course of physical science in the chemical industrial division.

Those in the second category follow, specially during the first two years, the instruction in mathematics given in the mechanical industrial division. During part of the second year, and during the whole of the third year they shall devote themselves mostly to the branches of mathematics, to physics, and to astronomy.

7. In the higher school of science, destined to widen the circle of knowledge from the purely scientific point of view, there shall be lectures on the following subjects:—

Mathematical and physical sciences, exclusive of matters belonging essentially to the domain of any special school.

German literature.

French literature.

Italian literature.

English literature.

General history.

Swiss history.

General history of arts and archeology.

Public law.

Commercial law.

Civil and administrative law.

Political economy.

Statistics.

8. The instruction given in the *preparatory course*, extends over one year, and embraces the following subjects:—

Mathematics:—

a. Algebra, and analysis of algebra.

b. Solid geometry, plane and spherical trigonometry, and analytical geometry of plane surfaces.

c. Elementary mechanics.
Elements of descriptive geometry:—
Applied geometry.
Experimental physics, chemistry.
German language.
French language.
Industrial drawing.

The following auxiliary establishments are destined to complete the instruction given.

1. A library.
2. A collection of engravings, of ornamental architectonic figures in plaster, to serve as models in the different drawing classes.
3. A collection of types of every kind of building materials, as well as a choice of models of buildings.
4. A collection of models of machines.
5. Sets of instruments for surveying, &c.
6. An assortment of tools and materials used for instruction in mechanical technology.
7. A collection of models and materials used for instruction in chemical technology and pharmaceutics.
8. A collection of objects, models, and tools more particularly bearing upon forest culture.
9. Collections in zoology, botany, mineralogy, and palæontology.
10. An archæological museum.
11. A workshop for modelling in earths or plaster.
12. A workshop for wooden constructions.
13. A workshop for the construction of metal machines.
14. A laboratory for operations in analytical chemistry.
15. A laboratory for industrial chemistry, and pharmaceutical manipulations.
16. A physical laboratory and cabinet.
17. An observatory.
18. A botanical garden.
19. The forests, collections, and libraries which the canton and the town of Zurich, will acccording to existing agreements, place at the disposal of the school.

The youths who study in the polytechnic school are divided into regular pupils and auditors, the first being such as intend to go through the complete course of studies in one of the first six divisions of the school; the others, such as only attend certain lectures in the establishment.

Each regular pupil pays 100 francs a year for instruction, and 5 francs in entrance fee, which payments cover all the obligatory and non-obligatory lessons contained in the programme.

For attendance on any private class of a professor an honorarium of 5 francs per semester for one lesson a week is paid.

The pupils pay besides an indemnity for the use of library, laboratories, and workshops.

The supreme direction of the school is vested in the Federal Council, which nominates the members and the president of the School Council, to which is intrusted the immediate direction and supervision of the school.

Prussia.

Report by Mr. West on Elementary Education.

Berlin, July 1, 1868.

The Prussian Government has lately published a statistical report upon elementary education in the Prussian States for the years 1862–64. It appears that this report is the fourth of the kind published since 1819, and it gives a very complete survey of the state of elementary education existing in Prussia in the year 1864. In order to ascertain the progress which has been made, the statistics contained in the present report are compared with those published in the previous ones for the years 1819, 1838, and 1859–61, and it results that, notwithstanding the very general and satisfactory extension of elementary education throughout the kingdom, it was not in 1864 as universal as could be desired.

In the year 1819 the number of elementary schools in the towns was 2,462 of which 766 were for Catholics and 1,696 for Protestants. In the country districts there were 17,623 schools, 4,814 for Catholics and 12,809 for Protestants. The total number of schools, therefore, in the whole country was 20,085. The proportion of Catholics to Protestants at that period is stated to have been about 37 and 61 per cent., 2 per cent. being composed of Jews and other denominations. The Catholic schools, however, did not exceed 28 per cent. This is accounted for from the fact that educational legislation did not obtain firm root in many of the Catholic provinces until after 1819. No certain data as to the proportion of schools to the number of inhabitants can be obtained from this report, and the report for 1838 is also unsatisfactory on this head. The population is stated to have been 14,098,125 in 1838, and the number of schools 22,839, but for some reason unexplained a number of schools which are now classed as elementary are not included in this number.

The report for 1859–61 estimates the number of public elementary schools at 24,763, which were divided into 36,783 classes, each class having a separate master, but, owing to vacancies and other causes, there appear only to have been 35,372 teachers. The population at this period is given as 18,476,500, of which 12,865,368 inhabited country districts and 5,611,132 towns. It appears also that the village schools were seven times as numerous as those of the towns, the number of village schools being 21,828, and the number of town schools only 2,935.

Comparing these figures, therefore, with those contained in the report of 1819, the following result is obtained:—

Total No. of Schools	..	1819	20,085
,,		1861	26,197

Of the number of schools in 1861 16,540 were Protestant,
8,082 ,, Catholic,
141 ,, Jewish,
1,434 ,, Private.

Of this last number—
878 ,, Protestant,
348 ,, Catholic,
208 ,, Jewish.

The increase of schools in the towns between the years 1819 and 1861 appears to have been 9 per cent. Protestant, and 26 per cent. Catholic; 19 per cent. for the whole town population. In the country districts during the same period the increase was 15 per cent. Protestant, and 46 per cent. Catholic; 24 per cent. for the whole country population, and 23 per cent. for the whole kingdom. The increase in the percentage of Catholic schools is worthy of remark, more especially as there are more difficulties in the way of their establishment and maintenance than is the case with Protestant schools. The provinces, which contain the Catholic population, are in some cases partly Polish,* the inhabitants few and spread over a large area, and the same facilities, therefore, for the extension of elementary education, are not so great as in the provinces, where the Protestant population preponderates.

The report for 1864 gives the following statistics for that year, but they will not be found to differ very materially from those of 1861.

The total number of public elementary schools is stated to have been 25,120, with 38,053 classes, presided over by 36,819 teachers, and divided into religious denominations as follows:—

		Classes.	Masters.	Mistresses.
Protestant schools ..	16,656	25,338	23,805	463
Catholic ,,	8,204	12,334	10,622	1,549
Jewish ,,	260	381	376	4
	25,120	38,053	34,803	2,016

In the Country.

		Classes.	Masters.	Mistresses.
Protestant schools..	14,733	17,378	16,391	77
Catholic ,,	7,188	9,342	8,483	727
Jewish ,,	50	50	50	—
	21,971	26,770	24,924	804

In the Towns.

		Classes.	Masters.	Mistresses.
Protestant schools..	1,923	7,960	7,414	386
Catholic ,,	1,016	2,992	2,139	822
Jewish ,,	210	331	326	4
	3,149	11,283	9,879	1,212

The number of private schools was 1,460, with 3,105 classes, and 88,064 pupils; 1,119 were in the towns, and 341 in the country districts. The schools were divided into religious denominations as follows:—

* The number of Polish children in the elementary schools was:—

Province of Prussia	8,933
,, Posen	27,528
,, Pomerania	1
,, Silesia	8,978
	45,440

Out of this number 1,960 could speak Polish only.

	Towns.	Country.	Total.
Protestant	727	195	922
Catholic	283	126	409
Jewish	109	20	129
	1,119	341	1460

The population had, it appears, increased since 1861 from 18,476,500 to 19,226,270, over two millions and a half of whom do not speak German, but of this number of inhabitants there were 3,457,301 children of from 5 to 14 years of age, or 17·9 per cent. They were divided into religious denominations as follows:—

Protestants	1,876,641
Catholics	1,106,609
Jews	37,483
Dissenters	6,010
	3,026,743

It would thus appear that 430,558 children did not receive any elementary education, or it would be more correct to say they do not appear in the school returns, for the report accounts for them by stating that 61,388 attended schools not classed as elementary schools, 23,939 were in orphanage, 9,331 left school before the age of 14, 9,199 were sick temporarily and 2,442 permanently. There were, therefore, only from 15,000 to 16,000 children who did not receive the elementary education of the State.*

The proportion of the population which has received this primary instruction appears to vary considerably in different provinces. In some provinces it is 15 to 16 cent.; in others 1 per cent., and in some it is as low as ¼ per cent. On the other hand in the town of Berlin only two men were found who had not received school education.† I find by a table recently laid before the Chambers, that out of 99,716 recruits enlisted during the years 1866, 1867, 95,916 are returned as having received school education, while 3,800 or 3·81 per cent. only were without it.‡

The report then furnishes details respecting the salaries of the schoolmasters, and general cost of the primary instruction. The

* The Report lately issued by the Registrar-General in England shows that in the year 1866, 21·6 per cent. of the men who married, and 30 per cent. of the women signed their name by making their mark. In Ireland, nearly half signed by a mark. In Scotland, only 16·8. In France, 33·42 per cent. failed to sign their names.

† The last census taken of the population of Berlin, gives a total of 702,439, made up as follows:—

Fixed population	683,675
Moving do.	2,060
Military do.	16,308
Diplomats	396
	702,439

The population in 1861 was 547,571, in 1864, 632,379, shewing an augmentation of 84,808 in the three years ended 1864, and 70,058 in the three years ended 1867.

‡ This is a remarkable contrast to the state of education among recruits in England. I find by a return showing the number of recruits who joined the depôt school of the Foot Guards at Warley, during the year 1867, that out of 507, 173 could neither read nor write, or over 34 per cent.

salaries are made up by fees paid by the parents, and oftentimes in the country districts by payment in kind, such as lodging, firing, &c., &c. The amount of the fees varies in each locality. The most ordinary rate appears to have been a fourth in the towns, and a thirteenth in the country. The total amount of the fees collected in the public schools was, in 1861, 2,322,396 thalers (£348,359 8*s.*), and in 1864, 2,518,449 thalers 20 s. gr. (£377,767 9*s.*) The towns contributed nearly half of this amount. These fees, however, do not constitute a third of the entire income of the masters: they collected besides from the parishes and certain endowments, 4,824,903 thalers (£723,735 10*s.*) in 1861, and 5,256,944 thalers 20 s. gr. (£788,541 14*s.*) in 1864. The State also gave a subsidy of 334,589 thalers (£50,188 7*s.*) in 1861, and and 302,564 thalers 20 s. gr. (£45,384 14*s.*) in 1864, so that the total income derived from these different sources amounted in 1861 to 7,481,888 thalers 10 s. gr. (£1,122,283 5*s.*), and in 1864 to 8,077,959 thalers (£1,211,693 17*s.*). The average income of each master during the period 1859, 1861, was in the towns 281 thalers (£42 3*s.*), in the country 181 thalers (£27 3*s.*), and in the whole kingdom 210 thalers (£31 10*s.*).

During the period 1862, 1864, the average was 294 thalers (£44 2*s.*) in the towns, 185 thalers (£27 15*s.*) in the country, and 218 thalers (£32 14*s.*) in the whole kingdom. This comparison does not show as large an augmentation in the amount of the salaries of schoolmasters as might have been expected under the circumstances. If we turn, however, to the report for the year 1838, it will be found that the condition of the schoolmaster then was very much worse than in 1864. It was calculated that in 1838 there were 493 masters in the receipt of salaries as small as from 50 thalers (£7 10*s.*) to 100 thalers (£15) per annum, and there were many in towns who received still smaller stipends. This latter class disappears entirely in the report for 1864, and there were only 158 masters who received from £7 10*s.* to £15, while a general diminution in the number of the recipients of small salaries is observable. In the country districts in 1838, out of 18,140 schoolmasters, 12,083 had salaries under 100 thalers (£15) a-year, whereas in 1864 there was no salary at all under £7 10*s.* There were, however, still 1,778 masters out of 55,774, who only received from 50 thalers (£7 10*s.*) to 100 thalers (£15).

Under the condition of the salaries in 1838 bare existence must have been difficult, but it must be borne in mind, however, that at that period the prices of the necessaries of life were considerably lower than than they have been since. The Prussian schoolmaster of 1838 was moreover generally a broken down artisan, who may have accumulated a small sum, and who, unable from sickness to continue his trade, passed the rest of his days in teaching what little knowledge he may have acquired. But the schoolmaster of 1864 was in a different social position. He was generally a man who may be said to have received an education, and who had passed an examination. He had acquired habits and tastes which had raised him in the social scale, and had been to a certain extent cared for by the State. Although his income had not, perhaps, increased in proportion to his wants, his capability of fulfilling his duties, and his general usefulness in the country were much more apparent. With the small pecuniary assistance afforded by the State, the results obtained would almost seem impossible, but it must be remembered that elementary education is compulsory; that fines, penalties, and even imprisonment are imposed for non-compliance with the rules and regulations laid down, and that the State is thus

enabled to make the system support itself to a great extent. The custom, however, of sending children to school at the prescribed age is so universal, and its expediency so generally admitted that what might appear in any other country a most arbitrary law, in Prussia is regarded simply as one producing salutary social results.

The State expended, in 1864, 2,868,848 thalers (£430,327 4*s*.), this included the expenses of 55 seminaries for teachers, and the expenses of the erection of schools. It also contributed by direct grants and subsidies the sum of 394,503 thalers (£59,175 9*s*.). The amount raised by the fees, as before stated was 8,077,959 thalers (£1,211,693 17*s*.), so that the total cost to the country of primary education was 10,946,807 thalers (£1,642,021 1*s*.), out of which the State paid only 3,263,351 thalers (£489,502 13*s*.). The small importance of the State contributions is still more apparent when the sum which it adds to the amount imposed upon each inhabitant for educational fees is taken into into consideration. Each person in the towns on an average pays 22 s. gr. 9 pf., or (2*s* 2¾*d*.) to which the State adds 6 pf., or about ½*d*. Each resident in the country pays 13 s. gr. 7 pf. (1*s*. 3¾*d*.), to which the State adds 8 pf. (something under 1*d*.). Such being the nature of the compulsory system adopted, it is important to remark that, notwithstanding the local burthens which it imposes, the number of convictions for non-compliance with its provisions were so few in 1864 in the whole country, that the report makes no mention of them.

In the year 1866, however, we are informed that there were 2,434 penalties imposed in Berlin, and that 758 fathers were sentenced to prison.

The Prussian system of elementary education has now been extended to Hanover, Holstein, Schleswig, Cassel, Wiesbaden, and Frankfort, and an additional charge is consequently imposed on the State in the following ratio :—

	Th.	s.gr.	pf.	£	*s*.	*d*.
Hanover	28,625	24	4	4,293	17	4
Holstein	3,061	3	9	459	3	3
Schleswig	4,023	16	7	603	10	6
Cassel	144,430	10	2	21,664	11	0
Wiesbaden	22,422	24	4	3,363	8	4
	202,563	19	2	30,384	10	5

Although the education given under this system is purely elementary, and of the most practical kind, still it might have been supposed that its universality would have entailed a much larger expenditure to the State than is actually the case. When we consider the really small amount of the salaries of the teachers for the social position which they now hold, it is most satisfactory to find that there are such men willing to devote themselves to a career which offers such inadequate pecuniary remuneration. A State grant alone could ameliorate their condition, for a further increase of local burthens could scarcely be borne by a population already poor, and in many provinces oftentimes requiring not learning, but even the first necessaries of life. The system, however, appears in general to work so well in all its details, that the arguments used against compulsion in other countries can scarcely be urged against it in Prussia. The poor man, even if he feels temporarily the loss of the earnings of his children, submits to it patiently, and seems to recognize the advantages which accrue not only to the children themselves in after life, but also to himself, by the greater amount of

assistance which their superior social condition enables them to afford him in his old age.

The "half time" system also, which partially prevails, does not entail upon the parents the loss of the whole of the earnings of their children.

The theory of the Prussian system, in making primary education compulsory, appears to have been founded upon the recognized fact that great apathy, as regards the education of their children, prevails among the poorer classes. As a preliminary step, therefore, it was necessary to get rid of it, and as it did not seem possible to do so by mere inducement, it was resolved to establish a compulsion which should be judiciously and carefully applied, the odium attached to which would gradually diminish as the advantage accruing from it became apparent, and thus render its application necessary only in a modified form. Such a result would, it seems to have been thought, be attained by creating a direct local interest in the management of the primary schools by rating so that parents, as well as local authorities, should find themselves associated with the State in carrying on the great work of social improvement. The report under consideration leaves no doubt as to the successful result of this theory. It must be borne in mind, moreover, that compulsion is applied directly, and not upon the principle which the Colliery Acts in England seek to apply it. Children are not punished because their parents may have refused them instruction; for the prohibition to work after a certain age unless provided with a certificate that they can read and write, which, by the wilful neglect of their parents, they may not be able to obtain, virtually amounts to a punishment, but, on the contrary, the parents are punished if they neglect to have them duly instructed. The direct application of the principle of compulsion, therefore, as far as Prussia is concerned, would seem to be attended by a better result than could be obtained by any other method, which must more or less leave the parents an option on the question of the education of their children, and thus give place for that apathy so fatal to educational progress, and which it is the main object of the system to overcome.

The question of the efficiency of the schools in which primary education is given appears to be satisfactorily answered by the amount of practical knowledge which has been generally disseminated, and more is not sought to be obtained from them. The schoolmasters are, doubtless, not sufficiently well paid, and their education and training may not perhaps come up to the standard sought in other countries, but we find notwithstanding a gradual improvement taking place both as regards salaries and social position, not consequent on any direct pecuniary intervention on the part of the State, but simply in the one case from the increase of funds derived under the "rating" system from an increasing population, and in the other from the growing requirements of the population demanding increased capability.

A very able report was lately drawn up and published by Mons. Beaudoin, an inspector of universities in France, upon primary education in Germany. I have alluded to some of the statistical information contained in this report in connexion with education in Spain, but as it sets forth the advantages obtained from the Prussian system as applied to other parts of Germany, it may not be without interest in this place.

Saxony.—Primary education in Saxony has been compulsory since 1835. Every child must be sent to school at six years of age. Any

infraction of this rule is punished, as in Prussia, by fine or imprisonment.

Altenburg, Meiningen, Weimar, and Gotha.—In the Duchies of Altenburg, Meiningen, Weimar, and Gotha, the system produces its most favourable results. During a period of 50 years no penalty appears to have been inflicted for an infraction of its laws.

Hesse.—In the Grand Duchy of Hesse primary education was made compulsory in 1827. There are 1,760 schools, which give instruction to 135,000 children.

Nassau.—In the Duchy of Nassau (now Prussian) compulsory education has existed since 1817, and there is not now a single inhabitant who has not passed the schools.

Bavaria.—The compulsory system was adopted in 1856 in Bavaria. There are 7,113 schools giving instruction to 482,774 girls and 468,501 boys. The percentage of those who can neither read nor write is not more than 5 per cent.

Wurtemburg.—Compulsory education has existed in Wurtemburg since 1810. The number of schools is 2,337. The teachers are said to be better off in this kingdom than in any other part of Germany.

Austria.—Although primary education is compulsory also in Austria, and the penalties even more severe than in Prussia, we do not find the same satisfactory results. In Croatia and parts of Gallicia the attendance in schools is only from 10 to 18 per cent. of the population. In the south of Hungary 21 to 38 per cent.; but in Carniola, Istria, Transylvania, and parts of the Tyrol, 92 to 96 per cent., and on the frontiers of Saxony and Switzerland 97 to 99 per cent., and even 104 per cent.*

It will thus be seen that the principle of compulsory education obtains more or less throughout the whole of Germany, and has been attended with decided success, except only in the case of Austria.

In Prussia the principle seems to have been first recognized by general regulations in the year 1763, and applied to primary schools. No general law, however, has ever passed the legislative bodies since the establishment of a more constitutional form of government, although several attempts have been made, from time to time, to pass one. The system seems, in a great measure, to have worked its own way, and to have depended more on communal and municipal regulations in all matters of detail, than on direct legislative enactments. The project of law, however, at present under consideration, has for object to embody into one general measure all previous legislation of whatever nature, and to establish one general and uniform system of elementary education for the whole kingdom. As the provisions of this law do not make any very material alteration in the existing system, it is probable that sooner or later the chambers will pass a general measure of the kind. I subjoin a short statement of what is, in fact, the existing system as embodied in this project of law.

It is provided that all children from their sixth† to fourteenth year must receive regular instruction in religion, and the requirements necessary to fit them for the duties of civil life.

This instruction embraces:—

1. Religion, including Bible history.
2. Grammatical speaking and writing the German language.
3. History and geography.

* This percentage, however, includes children sent to school before the age required by law.

† By existing regulations, children must be sent to school at five years of age.

4. Arithmetic and mensuration.
5. Drawing and singing.

As a rule the national schools must be Evangelical or Catholic, but in the case of a population containing Jews, wherever a sufficient number of Jewish children are found, Jewish elementary schools may be established and considered as national schools.

No child is to be refused admittance to the schools on account of difference of religion.

Children who may belong to a religion which differs from that of the teacher are not to be forced to attend his religious instruction against the will of the father or guardians. If there are more than fifteen children in such a position care must be taken to provide them religious instruction according to their persuasion, from the teachers in the neighbouring districts.

The child on leaving school, when he has attained the age of 14, shall be furnished with a certificate stating how far the aim of the national schools has been in his case attained.

No teacher, as a rule, can instruct more than 80 pupils.

If any person prevents his own children or those under his charge or in his service from attending the schools, in accordance with the regulations, the police may interfere. The penalties are fine or imprisonment.

The schools are supported by municipal and communal rating, and a minimum salary for teachers is established. The principle of payments in kind, or corresponding compensation to be given by those bound to support the national schools is still maintained. For instance, a teacher of an elementary school in a town of less than 10,000 inhabitants must be provided with a dwelling free of expense, and his income must amount to £30 or £37 per annum, and in towns containing over 10,000 inhabitants this minimum may be raised to double this amount. Teachers in the country districts receive free lodging and fuel, and so much land, natural products or equivalents in money, as may be judged by the provincial council necessary for the maintenance of their position.

The law, after prescribing in detail for the stipends, and for compensation due under certain circumstances, finally sets forth that all provisions opposed to its provisions are to cease to exist whether they are contained in general or provincial laws and ordinances. For a considerable time a measure of this nature has been demanded by the provincial councils, who have found the existing regulations insufficient. During the period which elapsed between 1806 and 1815 which witnessed the downfall and re-establishment of the Prussian State, the basis for primary education laid down in 1763 underwent a complete change, for the social condition of the country had been altered by political events, and the provinces and communes, no longer isolated from the administrative and executive power, became united to it by a community of interest, which, connected as it was with the great system of military organization, had an important influence on public education.

It may seem perhaps inconsistent with modern theories to attribute such an influence in any way to a system of what is in fact compulsory military service, but it must be remembered that the change which created it produced throughout the country a profound conviction of the necessity of unity of action among all classes for the common welfare. As soon, therefore, as the great object of national existence had been secured, the habit of organization engendered by the military

system, which had secured it, extended itself to civil life, and a more perfect system of civil organization which should include the great question of public instruction, was demanded of the executive. Upon this demand was based the ministerial regulation for primary schools of 1845, and the subsequent projects of 1848 and 1850, neither of which, however, on account of unforseen political events, ever became law. The same demand has since been repeated by the representative body, and has resulted in the presentation to the upper house of the project of law above alluded to. Its provisions, in fact, do not go further than to establish, upon the basis laid down in the articles of the Constitution, a clear and definite system of public instruction which the vagueness of previous ordinances has hitherto more or less left in the hands of local authorities.

I subjoin here these articles as they stand in the Constitution of 1850.

Articles in the Prussian Constitution of 31st January, 1850, relating to Public Instruction.

XXI. The education of youth shall be adequately provided for by public schools.

Parents and their representatives must not leave their children, or those committed to their charge without the instruction which is prescribed for the public schools for the people.

XXII. Every one is at liberty to give instruction, and to found and conduct educational establishments, if he can prove to the proper State authorities his moral, scientific, and technical qualifications.

XXIII. All public and private establishments for instruction and education are under the superintendence of authorities named by the State.

Public teachers have the rights and duties of servants of the State.

XXIV. In the organization of public schools for the people, as much regard as is possible is to be had to the circumstances of different creeds. The respective religious societies conduct the religious instruction in public schools. The management of the external affairs of the public schools belongs to the commune. The State, with the legally regulated participation of the communes, appoints the teachers of the public schools for the people out of the number of qualified persons.

XXV. The means for the establishment, maintenance, and extension of the public schools for the people are to be provided by the commune, and in cases of proved inadequacy of means will be completed by the State. The obligations of third persons arising from special legal privileges remain in force. The State accordingly guarantees to the teachers in the public schools a fixed income suitable to local circumstances. In the public schools for the people the instruction is gratis.

XXVI. A special law will regulate the whole system of instruction.

It is this special law which is now under consideration, and although it has been framed at the desire of those interested in the further extension of elementary education, the expediency of a more direct intervention on the part of the State in matters of detail which such a law must necessarily give to it, will give rise doubtless to much difference of opinion.

SACKVILLE WEST.

Norway.

Extracts from the Law of 16th May, 1860, on Popular Schools in the Rural Districts.

Art. 1.

The object of the popular school is to aid domestic education in instilling into the youth of the country true Christian enlightenment, and to provide them with the knowledge and the skill which every member of the community ought to possess, as also, in as far as circumstances will allow, to extend further that general culture.

Art. 2.

The popular schools are divided into lower and higher schools.

a. The lower popular school is a district school, in which the children belonging to the district receive the instruction which the law makes obligatory, and also further instruction, which is not obligatory.

b. The higher popular school shall be common for several districts, or for a whole school community, or for several school communities, and shall provide a superior degree of instruction for the children belonging to the district union, or to the school communities.

Art. 3.

Each school community is divided into school districts, the limits of which shall be determined by the school commission, who in doing so, must take care that each dwelling is included in the district of the school which is within most convenient reach.

If the dwellings are situated so near to each other, that a number of at least 30 children belonging to them, who are within the school age, can conveniently attend one and the same school, one shall be opened in a building hired or erected for the purpose. Should the number of children in any one district be so great as to render it unavoidable to have them all taught by one master at the same time, they shall either be divided into sections, which shall attend school at different hours, or assistant teachers (male or female) shall be appointed.

When the distances make attendance at a fixed school difficult or impossible, the school may become movable, but in every place in which it is kept a proper school-room must be provided.

Art. 5.

The subjects of instruction in the district schools are:—

a. Reading.

b. Religion.

c. Selections from the reading book, particularly such as treat of geography, history, and natural science.

d. Singing.

e. Writing.

f. Cyphering.

When the school commission find it feasible, the boys should be taught gymnastics and military exercises. The school shall open and close every day with a prayer, and the singing of a hymn, or with one or the other.

Art. 6.

As a general rule, each district school shall be open during twelve weeks in each of the two divisions of the year; but the schools in which the children are divided into classes according to their skill and knowledge, shall be open only nine weeks in each half year. Changes may, however, be introduced herein, if the proper authorities think fit. Each week shall have six school days, and each school day, on an average, six school hours.

Art. 7.

Any time beyond that fixed in the preceding article, which the school commission, with the approval of the communal administration, may assign, for the instruction of the children of a district, whose parents or guardians desire it, shall be devoted to further instruction in the branches comprised in the district school, to which may be added, if it be deemed desirable, one or more of the subjects comprised in the higher popular school.

Care shall be taken that in fixing the time during which the children of the popular school are bound to attend, the most convenient periods of the year be selected.

Art. 8.

The district schoolmasters may be appointed to undertake the whole of the instruction (the obligatory and the voluntary part) in one or more district schools, or merely in the one or the other division.

Art. 9.

If there be any children in a district who, having attained their fourteenth year, are found so deficient that they are incapable of taking part in the instruction in the school, the school commune must provide separate instruction for them, until the parish clergyman and the master, to whose school they belong, shall, after consulting together, declare that the children are fit to be admitted into the school.

The expenditure caused by this special provision of instruction, shall be refunded by the parents or guardians of the children.

Art. 10.

In every industrial establishment in which 30 workmen or more are regularly employed, or in every group of smaller establishments of the kind, situated so near to each other that the provisional administration (*stifts directionen*) deems it feasible for them to have a school in common, and who employ in the aggregate the number of workmen mentioned above, a special school shall be instituted for the children, which school, besides satisfying the conditions laid down in Arts. 5 and 6, shall, during at least 16 weeks in the year, impart instruction such as the voluntary instruction mentioned in Art. 7, as given in the district school.

The same conditions are binding on existing manufactories and other industrial establishments, in which the number of workmen employed is not less than 20. If children, whose parents are not employed in the establishment, can conveniently attend the school, they shall have the right to do so, provided it can be done without injury to the instruction imparted.

The provisions herein laid down shall not prevent the owners of industrial establishments from making arrangements, with the consent of the respective provincial and communal administrations for con-

necting the school belonging to the establishment, with the general school system of the commune.

Art. 11.

If the school commission deem it advisable, they may with the sanction of the communal authorities, erect infant schools, the definite organization of which shall be determined by the school commission. These schools may be under the guidance of female teachers.

Art. 12.

The school commission may, with the sanction of the communal authorities, institute work schools for the girls.

Art. 13.

If there be in any school community a district school in which the more complete instruction mentioned in Art. 7, is not introduced, the children of this school shall, if their parents desire it, and circumstances will admit of it, be permitted to attend the school of another district in which the instruction in question is given.

Art. 14.

Unless when otherwise decided by the school commission, the parents or guardians shall provide the children with the requisite reading and lesson books, writing materials, slates, &c., but the school furniture and teaching apparatus shall be provided out of the school fund.

Art. 15.

Every district presided over by a separate authoritive body (*Formandskab*), shall as a rule constitute a school community with a common school fund, &c., &c.

Art. 16.

The school fund arises from—

a. Interest on capital possessed by the school, or which may accrue to it.

b. Voluntary gifts.

c. Certain legal fees paid on various occasions, and granted to the schools.

d. Fines paid in accordance with the provisions of the present law.

e. Grants which may be made by the larger school community, or out of the public moneys.

Whatever other property the school may previously have possessed, it shall continue to enjoy.

The school commission may, with the sanction of the communal administration, determine that school money shall be paid by those children who participate in the non-obligatory instruction, and whose parents are not in indigent circumstances.

Whatever additional funds may be required to cover the expenditure of the school shall be provided by the school community according to the regulations established by the communal authorities with the sanction of the provincial authorities.

Art. 17.

All expenses connected with the erection and maintenance of factory and other such schools, shall be borne by the proprietery concerned,

and in the case of joint schools, by the proprietors in proportion to the number of workmen each employs. The industrial establishments to which schools are attached, shall, on the other hand, be exempted from all contributions to the schools of the commune.

Art. 19.

The communal administration possesses authority in all matters concerning the schools, and in consequence no expenditure which the commune in accordance with this law, is not bound to defray, can be imposed upon it, without the consent of the communal administration.

Art. 20.

The expenses connected with the erection of school buildings, and keeping them in repair, with the heating, lighting, &c., of the schools, and the maintenance of the schoolmasters, &c., &c., shall be defrayed out of the common school fund, unless the school commission, with the sanction of the provincial direction, determine that they shall be borne by the district.

Art. 22.

If the expenditure connected with the school cause a disproportionate burden to be imposed upon some one district in particular, the communal administration shall as much as possible equalize the burdens when levying rates, or by means of contributions from the common school fund.

Organization of the Higher Popular Schools.

Art. 33.

The school commission ought to endeavour to introduce higher popular schools in all places where they seem likely to answer the purpose. They may, with the sanction of the communal administration, be erected (with or without assistance from the fund of the amt*) as separate schools, or in conjunction with a district school, or with a seminary for schoolmasters. They may be erected for one parish alone, or for several parishes in common. Several districts acting together may determine to establish a higher popular school. So also several school communities or districts, each of which have established the lower division of a higher popular school, may join together to establish the higher division of the school . . . Higher popular schools may also, on the proposal of the amt authorities, be established at the cost of the amt fund.

Art. 34.

If the entire course of instruction in a higher popular school be extended over more than two years, the school shall be divided into two sections, the lower of which shall comprise the instruction given in the first two years of attendance, and the latter, that of the ensuing years. The instruction in the lower division shall form a complete whole in itself, yet shall be calculated to serve as a basis for the more extended instruction in the upper division.

Art. 35.

If circumstances render it desirable, each division of the school may be kept in a separate locality within the district for which the school has been established.

* A territorial division. Norway is, for administrative purposes, divided into Stifter, Amter, Herreder, &c.—Trans.

Art. 36.

In the higher popular school more extended instruction is imparted in the same subjects as are comprised in the lower popular school, and in as many of the subjoined subjects as the programme of each school may determine.

Norwegian language.
Geography.
History.
Natural science.
Drawing.
Measuring.

In the upper division of the school may be added—

Mathematics, and
Political economy.

And, where circumstances render it desirable, one foreign language.

If it be determined that instruction in religion shall cease in the upper division of the school, special hours shall, on the other hand, be set aside for reading the Bible, and for lectures on ecclesiastical history.

Art. 37.

In order to be admitted into a higher popular school the children must prove that they know the most important events in the Old and New Testaments, that they are familiar with Luther's Catechism, that they can read correctly, write a current hand, and know the four first rules in arithmetic.

No child can be admitted under 12 years of age unless with the special permission of the school commission.

When the standing of the district school admits of it, the above minimum of knowledge may be raised, with the sanction of the provincial direction.

Art. 39.

Every amt, or where the amt is subdivided, each of these divisions constitutes a school community with a separate school fund.

Art. 40.

The sources whence the amt's school fund is derived are:—

a. Interest of capital already possessed or which may accrue.

b. Subsidies which may be granted by the *Storthing* out of the public moneys.

c. Subsidies which may be granted by the administration of the amt concerned.

Obligatory School Attendance and Examinations.

Art. 49.

Children are bound to attend school from the completion of their eighth year until their names are struck off the school books.

The obligation to attend school is only binding during the school term fixed in Art. 6.

The names are generally struck off the school books at the time of the children's confirmation.* It may, however, be done when a child has completed his or her thirteenth year if the school commission find that he or she has acquired a sufficient amount of knowledge.

If a child's name is struck off the school books before the time for

* Generally when they have attained their 14th or 15th year.—Trans.

preparation for confirmation has begun, the parents and guardians are bound to take care that the child's religious knowledge does not decrease. If they neglect to do this the clergyman may demand that the child be sent to school again.

Under certain circumstances children of seven years of age may be admitted into the school.

Art. 50.

Parents or guardians who themselves undertake to instruct the children dependant on them, or who cause them to be instructed by private teachers in the subjects taught in the district school, may, on giving timely notice to the school commission, be exempted from sending the children to the popular school, but they must participate in the burdens imposed for the schools. If the school commission find that any child educated in private is not properly taught, they may demand that it shall be sent to the public school.

Art. 51.

No child bound to attend school can stay away without giving a satisfactory reason for doing so.

If parents, employers, or others who stand in the parent's stead, allow children to absent themselves from school without giving any satisfactory reason for so doing, and persevere herein after having been remonstrated with, a fine of from 24*s*. to 5 silver dollars may be imposed upon them by the school commission.

Manufacturers and other employers are bound, under the same penalties, to allow the children the proper time for attendance at school.

If parents, guardians, or other persons entrusted with the care of children, neglect them or conduct themselves so as to exercise a detrimental influence on the moral character of the children, the latter may be taken from them, and placed under the care of more conscientious persons, and the expenses caused by this may be reclaimed by the guardians of the poor from the culpable parents, &c.

If a young person who has been neglected (Art. 9) reaches his or her sixteenth year, and still obstinately refuses to submit to the means which the school commission has provided for his or her instruction, the commission is authorized to use compulsory measures, which must not, however, extend to imprisonment in any penal establishment.

Art. 52.

If it be found that poverty prevents parents from sending their children to school, the means for enabling the latter to attend school shall be provided from the poor fund of the district.

Art. 53.

Every schoolmaster is bound to keep a regular account of each child's attendance in school.

Art. 56.

A public examination of the children belonging to the district school is held every year in the presence of the clergyman or one or more members of the school commission, and all children above nine years of age who are educated in private are likewise bound to attend these examinations.

Art. 58.

In case of children absenting themselves from these examinations without due cause, the parents or guardians may be made to pay a fine of one silver dollar,

The law concerning the popular schools in towns does not vary from the above, except in fixing the seventh year as the term at which children are to commence attending school.

Extracts from Project of Law for an Improved Organization of the Higher Public Schools in Norway,* 1867.

Chapter I.

On the Object, and the General Organization of the Schools.

Art. 1.

The object of the higher public schools is to extend the general instruction given in the popular schools, and also to prepare the pupils for the university and for the higher special schools.

Art. 2.

The higher public schools are (1), middle schools; (2), gymnasiums. The latter are either Latin (classical) gymnasiums, or "real" (practical or scientific) gymnasiums.

Art. 3.

The middle school is meant to impart to those pupils who, on leaving it, consider their education to be completed, such general culture as may suffice for them, while the establishments are also to serve as preparatory schools for the higher public schools.

To the middle school may be added, if the commune concerned provide sufficient means, a practical "real" division, for which a plan shall at all events be drawn up. The object of the "real" division shall be to extend and develop the subject matter of the instruction received in the middle school, with especial reference to the future practical callings of the pupils.

Art. 4.

The gymnasiums shall, through means of a course of instruction forming a whole in itself, complete the preparation for the university and the higher special schools.

Art. 6.

The course in the middle school shall extend over six years. But in places where there are other schools with classes corresponding to the lower classes of the middle school, the latter may be organized with a shorter course, which must not, however, embrace less than three years.

The course of the practical "real" division shall, as a rule, embrace one year only, but it may be extended so as to embrace two. However, even in this latter case, the first year's course must in itself

* This project is the result of the labours of a commission, nominated by the Government in 1865, to make proposals for an improved system of public instruction, and which, having submitted its preliminary proposals for consideration to the University and the leading schools, revised them in conformity with the observations made by these various bodies, and having further thoroughly examined the educational systems of England, France, Germany, Belgium, Switzerland, Sweden, Denmark, and Russia, ultimately embodied the fruits of its deliberations in the present form.—Trans.

form a complete whole, though also serving as the basis of the instruction during the next year.

The course in the gymnasiums shall embrace three years.

Art. 7.

In the middle schools as well as in the gymnasiums, the entire course shall, in as far as the means will allow, be divided into classes, each of one year. No class must embrace more than two years.

Art. 8.

One or more preparatory classes may be connected with the middle school.

Chapter II.

Instruction, Examinations, and Time of Instruction.

Art. 9.

The teacher ought, in imparting instruction, to endeavour to cultivate independent mental activity in the pupils, and to accustom them to correctness, clearness, and decision of thought and expression.

Art. 10.

The subjects taught in the middle school are:—
Religion, the Norwegian language, geography, arithmetic, writing.
German, to begin with the second half of the first year.
Natural science and drawing, to begin with the second year.
Geometry, from the third year.
Latin and English, from the fourth year.
French, from the fifth year.

Between Latin and English the pupils must make a choice. Those that select the first-named language form a so-called Latin line; those that select the latter, an English line. The rest of the subjects are obligatory.

Art. 11.

In the practical "real" class the subjects taught are:—
Religion.
The Norwegian language.
Modern languages.
History.
Geography.
Political economy.
Mathematics.
The natural sciences.
Drawing, and
Bookkeeping.

If the communal authorities in any particular place desire it, other branches may be added to the course of instruction in the practical "real" class.

As regards languages and sciences, instruction must not be given to this class in common with the pupils of the middle school or the gymnasium.

Art. 12.

* * * * * *

B. The subjects of instruction in "real" gymnasiums, are:—

Religion.
Norwegian language.
Ancient Norwegian.
Latin.
German.
French.
History.
Geography.
Natural sciences.
Mathematics, and
Drawing.

Here also the pupils must choose between Latin and English; and ancient Norwegian is not obligatory.

Art. 13.

In the middle schools, as well as in the gymnasiums, the pupils shall also be taught singing and gymnastics, and military exercises.

Art. 21.

In the gymnasiums, as well as in the middle schools, the instruction concludes each year, in each class, with a public examination.

Whether other examinations shall be held in the course of the year, is left to the option of the school direction.

Art. 22.

The yearly examination of the upper class of the middle school is at the same time the examination of dismission from this school.

Further regulations for the examination of dismission from the "real" gymnasiums, and for the granting of certificates of maturity, shall be laid down in the separate plans to be drawn up for the practical "real" classes.

Sweden.

The law in Sweden regulating the organization of the primary or popular schools, more especially in the rural districts, the compulsory attendance at school, the penalties incurred by disobedience, the subjects and amount of instruction imparted, &c., &c., is almost precisely similar to that of Norway.

Extract from Royal Decree of 29th January, 1859, *concerning the Public Elementary Schools*,* *with Alterations introduced by Proclamation of 12th May*, 1865.

Art. 1.

The object of the public elementary schools founded by the State, is partly to impart a degree of general culture superior to that which can be acquired in the popular schools, and partly to lay the foundation of the scientific instruction which is carried further in the University, and in the higher special schools.

Art. 2.

All these schools shall be organized according to one plan, so that the studies and exercises shall have the same basis in all.

* These are a higher class of schools than the primary popular schools (*Folkskolhr*) mentioned above.

Art. 3.

With respect to the different amount of knowledge to be imparted to the children, and the consequent number of classes to be introduced into the schools, they shall be divided into lower and higher schools.

The higher schools are those in the two upper classes of which instruction is given in all the branches comprised in the plan of elementary education, or those in the two upper classes of which instruction is only given in those branches which are comprised in practical (*real*) education.

The lower schools are those in which that instruction is imparted which forms the basis of the extended instruction in the higher schools.

Art. 4.

In the higher elementary schools the pupils are divided into seven classes.

In the lower schools they are divided into five, three, or two classes.

The course of instruction in each of the four lower classes extends over one year, and in each of the three higher classes over two years; but in those schools in which there are a sufficient number of teachers for the purpose, each of the two upper classes should be divided into two sections of one year each, and in which instruction should be given separately.

Art. 7

The subjects of instruction in the first or lowest class of the elementary schools are, religion, Swedish, German, mathematics, geography, and natural science, calligraphy, and linear drawing.

Art. 8.

In the second class the same subjects are taught, with the addition of narratives from Swedish history.

Art. 9.

In the other classes the subjects of instruction are: religion, the Swedish, Latin, Greek, Hebrew, German, French, and English languages, natural science, history, geography, and philosophical propædeutics, which subjects shall be introduced in the order mentioned in the lesson plans A and B given hereinafter. With the instruction in the Swedish language shall be combined instruction in the language and the literatures of Norway and Denmark.

Art. 10.

For the exercises in music, drawing, and gymnastics, separate rules shall prevail.

Art. 11.

In the first and second classes all the pupils shall be instructed in common. But children of different religions shall, if it be desired, be exempted from participation in the religious instruction.

Art. 12.

In the other classes pupils whose parents or guardians desire it, may be exempted from participation in the classical lessons, but must in that case receive, during those hours, instruction in such other subjects as may be determined by the regulations.

Art. 15.

No pupil must refuse to receive instruction in music, drawing, or

gymnastics, unless the head master (rector) give his special permission, after considering the reasons pleaded in excuse.

Art. 22.

The number of hours of instruction weekly in the first and second classes of the elementary schools shall be thirty, in the third and up to the sixth inclusive, thirty-two, and in the seventh, thirty, for those pupils who learn the classical languages, and thirty-two for those who do not participate in this instruction.

The time of instruction must in no case exceed six hours in one day, and instruction must be given on every day in the week except Sunday. After two consecutive hours of study in the school-room, the lessons must cease for at least one hour; but three hours consecutive lessons may in some cases be permitted, provided the pupils be allowed at least two hours leisure before, and after these lessons. When the lessons follow immediately after each other, ten minutes' leisure, which shall be included in the time of the lesson, shall be allowed the pupils towards the end of each hour.

The time for instruction in music, drawing, and gymnastics, and also for prayers, is not included in the above-mentioned six hours.

Art. 24.

. . . A whole holiday may from time to time be given to the entire school, with the sanction of the proper authorities.

To the pupils of the highest class the rector may once, or at the utmost twice, a month allow a whole day to be devoted to separate studies under the rector's, or some other master's superintendence . . .

Art. 25.

The work of each day begins, and ends with prayer, and with the singing of a hymn.

Art. 28.

The age of admission is not below nine years, unless in exceptional cases the rector, on account of particular circumstances, deems it right to admit a younger child.

Art. 29.

The knowledge required for admission is:—

1. To be able to read Swedish fluently from manuscript, as well as from a printed book.
2. Luther's small Catechism, and some parts of the Bible history.
3. To be able to write a legible hand.
4. To be able to do sums in addition and subtraction with whole numbers, and to know the multiplication table well.

Children belonging to other religious confessions than those of the State, must furnish satisfactory proofs of their religious knowledge.

Art. 38.

Pupils who have remained two years in a one-year class, or three years in a two-year class, and who are still unqualified for advancement into a higher class, shall, unless illness, or some other good reason exists for their deficiency, be dismissed from the school.

Art. 42.

Pupils leaving the higher elementary schools after having completed

the course, receive a certificate in accordance with the result of the examination to which they are subjected.

Art. 44.

At the end of each school year the teachers shall hold an examination (each in his own branch) of the pupils of all the classes in public, and in presence of the school authorities, and of men of science, whom the latter may invite to come and lead, or witness the examinations.

The advancement into higher classes takes place after these examinations.

Art. 47.

Youths who have received a similar course of instruction in private, but whose parents or guardians wish them to be examined together with the pupils who have completed the course in the higher elementary schools, shall be admitted to examination, and shall, like the regular scholars, receive certificates according to proved proficiency.

Art. 100.

The rector and masters at the heads of classes must take great care that the tasks given to the pupils to execute and learn at home do not interfere with the rest and recreation so necessary for them.

PLAN OF LESSONS FOR THOSE PUPILS WHO TAKE PART IN THE CLASSICAL INSTRUCTION.

Number of Hours Weekly in each Subject of Instruction.

Subjects of Instruction.	I Class.	II Class.	III Class.	IV Class.	V Class.	VI Class.		VII Class.	
						1 Div.	2 Div.	1 Div.	2 Div.
Religion	6	5	3	3	3	2	2	2	2
Swedish language	8	4	2	2	2	2	2	2	2
Latin	—	—	10	8	8	8	8	7	7
Greek	—	—	—	6	5	6	6	5	5
Hebrew	—	—	—	—	—	—	—	—	—
German	—	6	4	2	2	1	1	—	—
French	—	—	—	—	3	4	4	5	3
English	—	—	—	—	—	—	—	—	—
Mathematics	8	5	4	5	4	4	4	4	4
Natural science	2	2	2	2	2	2	2	2	2
History and geography	3	5	5	4	3	3	3	3	3
Philosophical propædeutics	—	—	—	—	—	—	—	—	—
Calligraphy and drawing	3	3	2	—	—	—	—	—	—
	30	30	32	32	32	32	32	30	30

PLAN OF LESSONS FOR THOSE PUPILS WHO DO NOT TAKE PART IN THE CLASSICAL INSTRUCTION.

Number of Hours Weekly in each Subject of Instruction.

Subjects of Instruction.	I Class.	II Class.	III Class.	IV Class.	V Class.	VI Class. 1 Div.	VI Class. 2 Div.	VII Class. 1 Div.	VII Class. 2 Div.
Religion	6	5	3	3	3	2	2	2	2
Swedish language	8	4	4	3	3	3	3	3	3
German	—	6	5	3	2	2	2	—	—
English	—	—	3	3	3	2	2	3	3
French	—	—	—	3	4	5	5	5	5
Mathematics ..	8	5	7	8	7	6	6	6	6
Natural science ..	2	2	3	3	Nat. Hist. 2 Physics 2	1 3	1 3	— 2	— 2
						Chem. 2	2	Chem. Min. 3	3
History and Geography.. ..	3	5	5	4	4	4	4	4	4
Philosophical Propædeutics ..	—	—	—	—	—	—	—	2	2
Calligraphy and drawing ..	3	3	2	2	2	2	2	2	2
	30	30	32	32	32	32	32	32	32

APPENDIX.

SPAIN AND BISCAY.

Report by Mr. Consul Young on Education in Spain and Biscay.

ALTHOUGH the state of education in Spain is still very backward, it cannot be said that is in consequence of inattention to the matter, or of the paucity of means provided. Great exertions on the part of successive Governments have been made during the last quarter of a century to effect such reform in popular instruction as was demanded by modern changes, and advanced in social institutions, in order to bring within the reach of the middle and lower classes gratuitous teaching of a practical and useful description. That only a limited portion of the population should be found to avail themselves of the advantages which actually exist, is a fact attributed partly to the small interest taken by the majority of the educated and upper classes in the question, and partly to the influence of the clergy, who, although not offering direct opposition to the trifling instruction given in the primary schools, are still strongly opposed to any advance beyond certain narrow limits which they have distinctly marked, and at which, according to their views, the acquirement of knowledge by the people should stop. Moreover, a difficulty of a practical kind stands in the way in many parts of the country, from the long distances the children have to traverse in order to attend the schools. This last impediment is particularly felt in the Basque Provinces, where the population is scattered over a mountainous district, rendering it impossible for a considerable proportion of the inhabitants to avail themselves of the benefits of education offered at the towns or villages where the schools are established.

The general plan of education is, with a few slight modifications, that which was organized in 1845. Some important changes, however, have since been made in its administration. In the year 1847, the whole of the various branches of public instruction which, up to that time, had been under the superintendence of the Ministero de la Gobernacion (Home Office), was transferred to an independent Government Department, by the creation of the Ministerio de Comercio, Instruction y Obras Publicas (Office of Commerce, Education, and Public Works). Subsequently, by a Royal Order, dated 20th October, 1851, a portion of the affairs relating to public instruction passed to the Ministerio de Gracia y Justicia, the remainder, together with the Administration of Commerce and Public Works, being left to a distinct department revived under the ancient title of Ministerio de Fomento. Between these two last-mentioned Government Departments, public instruction was then divided as follows:—To the Ministerio de Gracia y Justicia was assigned all that relates to the three branches of primary, second, and university education, and the management of the normal, Lancastrian, and infant schools; while the Ministerio de Fomento took the affairs relating to education of a special character, such as the preparatory schools for architecture, mines, and civil engineering, the schools of art, industry and agriculture, navigation and commerce, the veterinary schools, and the colleges for the deaf and dumb. More recently still, the whole of the affairs relating to public instruction have been concentrated under the Ministerio de Fomento, which office is now divided into three sections, viz.:—

Public instruction; public works; agriculture, industry and commerce.

It is scarcely necessary to say that the military and naval colleges depend

on the War and Marine Departments; and as they cannot be considered to form part of the subject under review, no further description of them will be attempted.

Public instruction in Spain consists of four principal classes:—

(1) Primary instruction;
(2) Second or improved instruction;
(3) Education for the learned professions;
(4) Education of a special kind.

Primary instruction (*Primera Enseñanza*), although divided into two classes, elementary and superior, is purely rudimental, and limited to the teaching of moral and religious principles, reading and writing, and the elements of arithmetic, geography, and drawing.

Second instruction (*Segunda Enseñanza*) continues and perfects the slight education received in the primary schools, embracing such subjects as form the groundwork of a good general education, and ought to be completed within five years.

Education for the learned professions is indicated by the title, and is always pursued with a view to regular academic rank. The schools of study are five, viz., philosophy, chemistry, medicine, law, and theology.

Education of a special kind relates to the studies which are peculiar to certain careers and professions not conferring academic rank, but which are in some measure under Government supervision and control; such are the professions of engineers of roads, canals and bridges, mining engineers, architects, &c.

The establishments for public instruction are as follows:—Schools, institutes, universities, colleges, normal schools, and seminaries.

The schools (*Primera Enseñanza*) are supported by the municipalities. Every town is bound, in proportion to its population, to maintain one or more of these schools for gratuitous instruction. They are subject to Government inspection and supervision, and the schoolmasters and mistresses employed must proceed from the normal schools. At the same time, any private individual may undertake a school of this description, subject to inspection and the rules laid down for their management. Most of the villages throughout the country possess a school of *primera enseñanza*.

The institutes (*Segunda Enseñanza*) are subordinate to, and preparatory for, entering the universities. There is one in every province provided with professors, and supported by the State.

Of the universities it need only be said that they are the property of the nation, and that the professors are paid out of the public purse.

Colleges are also to be found in all the principal towns, but these are in fact merely private schools, which any one is at liberty to establish on his own account, subject to certain rules, statutes and supervision, and the condition of the teachers being approved, and proceeding from the normal schools.

Normal schools for the education of professors, schoolmasters, and schoolmistresses are established in all the principal towns, and are wholly sustained by the Government. Only natives and, of course, Roman Catholics, are admitted.

Seminaries are establishments destined specially for religious education, although lay pensioners are admitted.

It may be stated that the whole course of public instruction in Spain is open to every individual, however humble his origin, if his intelligence and pecuniary means are sufficient to enable him to pass through the various grades of education.

The following statistics indicate the state of public education generally in Spain, and particularly in the province of Biscay. When it is considered that the language of the natives of the Basque Provinces is an original and distinct idiom, with no sort of affinity to the Castillian, which, in many places, is even now scarcely understood, and when the nature of the country before alluded to is remembered, it will be seen that the state of popular instruction in Biscay, compared with the rest of Spain, is very satisfactory.

	Spain.	Biscay.
Males who can read and write	2,414,015	29,833
Females „ „	715,906	14,006
Males who can read only	316,557	4,859
Females „	389,221	7,415
Males who cannot read or write	5,034,545	47,329
Females „ „	6,802,846	65,401
Total population, Census 1860 ..	15,673,090	168,525

PERCENTAGE of Population.

	Spain.	Biscay.
Males who can read and write	15·40	17·63
Females „ „	5·57	8·39
Males who can read only	2·02	2 88
Females „	2·43	4·40
Males who cannot read or write	32·13	27·28
Females „ „	43·40	36·77

SCHOOLS.

	Spain.	Biscay.
The number of Public Schools is	20,198	165
„ Private „	4,155	41
Total	24,353	206

making one school for every 608 inhabitants in Spain, and one for every 817 in Biscay. The number of pupils was—

	Spain.	Biscay.
In Public Schools—		
Males	729,495	7,715
Females	372,034	3,698
In Private Schools—		
Males	80,398	1,224
Females	69,726	1,024
Total	1,251,653	13,661

making one scholar for about every 13 inhabitants in Spain, and one for every 12 in Biscay.

The number of pupils attending the superior schools (*Segunda Enseñanza*) during the following periods were :—

	Spain.	Biscay.
1857 to 1858	17,612	474
1858 „ 1859	19,928	367
1859 „ 1860	20,898	451
1860 „ 1861	21,478	379

Average number for each year—Spain, 19,979 ; [illegible], 442 ; being one for 784 inhabitants in Spain, and one for every 380 in Biscay.

The number of teachers and their several classes are as follows:—

	In Public Schools.		In Private Schools.	
	Spain.	Biscay.	Spain.	Biscay.
Male Teachers—				
Normal	106	4	23	1
Superior	1,141	14	159	28
Elemental	6,222	93	870	11
Without Title	6,413	31	340	8
Total	13,882	142	1,392	48
Female Teachers—				
Superior	196	2	68	1
Elemental	4,032	21	1,247	17
Without Title	614	10	395	3
Total	4,842	33	1,710	21
Grand Total ..	18,724	175	3,102	69

Total of teachers, male and female of all classes, in Spain, 21,826; in Biscay, 244; making one teacher for every 756 inhabitants in Spain, and one for every 700 in Biscay.

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